

REPORT OF THE IN FAMINE COMMISSION.

APPENDIX.

VOL. III.—EVIDENCE IN REPLY TO INQUIRIES OF
THE COMMISSION.

Chapter I.—Condition of the Country and
People.

Presented to both Houses of Parliament by Command of Her Majesty.



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famine affect certain classes more
greater among males or females, among adults or children, to what extent the birth-rate has been
and how far local influences, peculiarities of administration, or tenure, climate, soil, water, density of popu-
lation, systems of cultivation, &c., have tended to mitigate or intensify the inevitable effects of scarcity.

CONDITION OF THE COUNTRY AND PEOPLE

typical districts?
in

1. RAIN-FALL.

What is the normal system of rain-fall in your province? From what quarter does the rain come, and in what months does it fall? Give any returns you possess showing the average amount gauged in each month; and state whence they are obtained, and how the registers of rain-fall are kept. Within what limits can the rain-fall vary without doing serious injury? What is the amount of rain-fall for each month, and for the whole year, which, judging from past experience, you consider to be sufficient for agricultural necessities? What are the different agricultural operations depending on the due arrival of each of the expected monsoons or seasonal rains? What is the effect on the crops of the failure of any of these elements of rain-fall, and what is the combination of circumstances under which the worst results have been produced? So far as necessary differences in the several districts should be distinguished, and separate returns supplied for them.

page 1.

2. PAST FAMINES AND THEIR EFFECTS.

What part of the country is most subject to famine and freest from it, and why? What is known as to past famines, their causes, their dates, their extent locally, and their severity as tested by prices, mortality, loss of revenue, and expenditure on relief? Give, as far as possible, precise figures. Has the province suffered from any other destructive calamity, such as floods, frost, hail, locusts, blight, &c., to such an extent as to produce distress amounting to famine, or to create any general and widespread failure of the crop? To what extent do famines in any past period appear to have affected the general condition of the country, and how long has the effect lasted? Has the condition of the country improved in spite of such calamities? What is the normal increase in the population of the country, and how far has it been affected and kept down by famine? What are the facts on which your opinion on these last points is based?

vide separate volume, "Famine Histories."

3. AGRICULTURAL STATISTICS.

Give any statistics you possess as to the average area in each district under cultivation yearly, distinguishing food crops from others; the average amount of the chief food grains produced per acre; the total consumption in the district of such grains; the surplus that remains for export, or the deficiency that has to be supplied by import in ordinary years. How are these statistics collected, what amount of reliance may be placed on them, and what suggestions can you make for their improvement? If you have no statistics on these subjects, give any approximation or estimate you can.

page 41.

4. PROTECTION FROM DROUGHT.

What area of your province and of its several districts is protected from drought in an average year by irrigation from wells, tanks or jhils, canals, or channels from rivers? To how much of this area is the protection complete and permanent, and how much is dependent on the local rain? How much of the area so protected is devoted to food crops, and what is the total amount of produce from that area? What is the effect of irrigation of crops (other than food crops) in adding to the powers of the population to resist famine? Supposing canals, tanks, wells, and jhils to be utilized to the utmost extent and kept in the highest possible order, what extent of the country would be protected from drought in a year when there was a failure of the rain?

page 98.

5. STAPLE FOOD GRAINS.

What grains form the staple food of your people? When are they sown and harvested, and what are the critical times at which rain is essential to each of them, or at which a failure or an excessive fall of rain may be mischievous or ruinous?

page 149.

6. MANURE AND ROTATION OF CROPS.

What proportion of the cultivated land and what class of crops is manured yearly, and what is the average weight of manure given to the acre (1) in land constantly manured; (2) in land occasionally manured? If there is any customary rotation of crops or fallows, state it.

page 158.

7. AGRICULTURAL IMPROVEMENT.

Have any attempts been made by the Government or private persons to improve agriculture in your province, either in the way of introducing new or improved implements, or new staples, or improved seed, or better methods of cultivation, or better breeds of cattle, and so forth? and with what result? Have you any suggestion to make for such improvement? Is there any Government model farm in your province? Or have any estates under the management of Government or of the Court of Wards been used for the object of making experiments or setting examples of improved agriculture? If so, state the system of management, whom they were placed under, and what the results, financial and agricultural, have been. Have any improvements been made in the breed of cattle, in the forms of ploughs, carts, sugar mills, or any other agricultural instruments, or in the mode of drawing water from wells? Have any agricultural exhibitions been held in your province, and have you observed that any good result has been obtained from them?

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its later stages; when loss of
famine affect certain classes more or less
greater among males or females, among adults or children, to what extent the birth-rate has been affected;
and how far local influences, peculiarities of administration, or tenure, climate, soil, water, density of population, systems of cultivation, &c., have tended to mitigate or intensify the inevitable effects of scarcity.

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If no such census was taken, state what information is to be got from the mortuary returns for the period embraced by the last famine in your province, as compared with those for ordinary periods, and what conclusions may be drawn from those returns - page 526.

26. LOCAL RESPONSIBILITY AND FAMINE EXPENDITURE.

It has been laid down by the Government of India as a settled principle that local financial responsibility should be enforced in the case of a famine as far as possible. With this view, special taxation has recently been imposed on the country, the proceeds of which the Government has proposed to apply as a mutual assurance fund which will be available for the benefit of the people on whom the calamity of famine may actually fall. But it has been recognised that it would be preferable if some portion of this taxation could be made more strictly local, both in its levy and its application to relief purposes. Can you suggest any way by which it might be rendered practicable to provide that where State funds have been expended on the relief of famine, such expenditure should be recovered from the locality which has benefited by it under any system of taxation (in modification of or in substitution for that recently adopted and not in addition to it) in a manner that should bring into operation a sense of local responsibility, first, in the direction of securing the lives of the people, and second, of protecting them from unnecessary expenditure on relief? How could such a principle be applied to a smaller area than that of a province or presidency? Could the expenditure in a single district or subdivision of a district be recovered from that district or subdivision by such special taxation wholly or in part, or under any special circumstances, or in reference to any class of the community requiring relief, leaving a smaller or larger portion of the charge to be made good from the province or presidency at large, or from the resources of the Government of India? Could any plan be suggested under which, subject to similar limitations, a municipality might be required to bear the cost of feeding its own poor? What kind of special local taxation should be adopted for this purpose? What would be the probable effect (1) on the minds of the people, (2) on the temper of officials, of the knowledge that the cost of famine relief expended on their behalf or by them would have to be recouped by local taxation? Is there any reason to suppose that the sense of local responsibility, if it could be brought to bear, would not operate beneficially in the case of relief of the distressed portion of the population in India? - page 534.

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 Colonel J. L. Pearse - Commissioner, Nundidrug Division. - Q. 9, p. 309. Q. 10, p. 348. Q. 14, p. 417. Q. 24, 25, p. 533.
 Mr. L. Ricketts - Deputy Commissioner, Bangalore. - Q. 6, p. 174. Q. 7, p. 201. Q. 11, p. 360.
 Captain G. J. Van Someren - Conservator of Forests - Q. 23, p. 523.

RAJPUTANA.

Captain D. W. K. Barr - Political Agent, Marwar and Jeysalmere. - Q. 1 p. 38. Q. 5, p. 156. Q. 7, p. 201. Q. 9, p. 311. Q. 17, p. 463. Q. 18, p. 474.
 Colonel W. H. Beynon - Political Agent, Jeypore - Q. 16, p. 444. Q. 18, p. 474.
 Lieutenant - Colonel T. Dennehy - Political Agent, Dholpur - Q. 3, p. 94. Q. 4, p. 146. Q. 10, p. 348.
 Captain V. E. Law - Political Agent, Alwar - Q. 3, p. 93. Q. 4, p. 146. Q. 13, p. 396.
 Mahadeo Wasudeo Barvé - Member of Famine Commission. - P. 323.
 Deputy Surgeon-General B. Moore - Q. 1, p. 38. Q. 4, p. 147. Q. 18, p. 474.
 Major P. W. Powlett - Political Agent, Kotah - Q. 3, p. 94. Q. 4, p. 147. Q. 7, p. 202. Q. 10, p. 348. Q. 13, p. 396. Q. 17, p. 463.
 Mr. L. S. Saunders - Commissioner, Ajmere - Q. 4, p. 147. Q. 7, p. 202. Q. 12, p. 363. Q. 23, p. 525.
 Mr. L. D. Spencer - Political Agent, Eastern States. - Q. 3, p. 94. Q. 4, p. 147. Q. 13, p. 396.
 Mr. T. White - Assistant Commissioner, Ajmere. - Q. 7, p. 202. Q. 23, p. 525.

CENTRAL INDIA.

Lieutenant-Colonel P. W. Bannerman - Political Agent, Baghelkhand. - Q. 7, p. 202. Q. 9, p. 312. Q. 10, p. 349. Q. 13, p. 397. Q. 18, p. 474.
 Mahadeo Wasudeo Barvé - Member of Famine Commission. - P. 323.
 Lieutenant-Colonel Martin Mir Shahamat Ali - Political Agent and Superintendent, Rutlam. - Q. 18, p. 474. Q. 7, p. 203. Q. 9, p. 312. Q. 10, p. 349. Q. 11, p. 362. Q. 12, p. 364. Q. 13, p. 397. Q. 18, p. 474.
 Colonel W. Osborne - Political Agent, Bhopal - Q. 13, p. 397.
 Pundit Suroop Narain - Q. 10, p. 349. Q. 11, p. 362. Q. 13, p. 397.
 Mr. Wingate - Q. 1, p. 39. Q. 3, p. 94. Q. 4, p. 148. Q. 5, p. 157. Q. 6, p. 175. Q. 8, p. 236. Q. 11, p. 349. Q. 11, p. 362. Q. 12, p. 364. Q. 14, p. 417. Q. 15, p. 429. Q. 16, p. 444. Q. 17, p. 463. Q. 21, p. 502. Q. 23, p. 525.

HYDERABAD.

Mahadeo Wasudeo Barvé - Member of Famine Commission. - P. 323.
 Moulvie Mahdi Ali - Secretary to H.H. the Nizam's Government in the Revenue Department. - Q. 1, p. 39. Q. 3, p. 95. Q. 4, p. 148. Q. 5, p. 157. Q. 6, p. 175. Q. 8, p. 236. Q. 9, p. 236. Q. 9, p. 312. Q. 11, p. 362. Q. 13, p. 398. Q. 15, p. 430. Q. 16, p. 445.

ERRATA.

P. 348.—The reply to Question 10 is by Colonel Pearse.
 P. 363.—The reply to Question 12 is by Mr. G. F. Meiklejohn.
 P. 483.—Mr. Dharwar should be Mr. Charles, Dharwar.

APPENDIX.

CHAPTER I.—QUESTION 1.

What is the normal system of rain-fall in your Province? From what quarter does the rain come, and in what months does it fall? Give any returns you possess showing the average amount gauged in each month; and state whence they are obtained, and how the registers of rain-fall are kept. Within what limits can the rain-fall vary without doing serious injury? What is the amount of rain-fall for each month, and for the whole year, which, judging from past experience, you consider to be sufficient for agricultural necessities? What are the different agricultural operations depending on the due arrival of each of the expected monsoons or seasonal rains? What is the effect on the crops of the failure of any of these elements of rain-fall, and what is the combination of circumstances under which the worst results have been produced? So far as necessary, differences in the several districts should be distinguished and separate returns supplied for them.

PUNJAB.

The rain-fall is registered at the head-quarters of each tahsil and district. At the tahsil offices the observations are made, and the registers written up by one of the native revenue clerks under the supervision of the tahsildár. At the head-quarters of each district the observations are similarly made either at the tahsil or sadar office.

At the great majority of these observing stations (aggregating about 150) the gauge used for registering the rain-fall is a cylindrical copper tube, into which the rain-fall is collected from a wide funnel. The depth of water in the tube is measured by a metal scale. The dimensions of the tube and the funnel are so adjusted that one inch of water in the tube represents a fall of one-tenth of an inch at the mouth of the funnel, that is to say, on the surface of the ground. At a few stations more elaborate gauges are in use.

In addition to these weekly reports by the land revenue establishments, a system of meteorological observations is carried out at the head-quarter medical dispensary of each district, and reported to a selected medical officer at Lahore, who fills the office of Meteorological Reporter to the Punjab Government. These observations are carried on with accurate instruments, and include, besides the rain-fall, humidity and temperature of the atmosphere, barometric pressures, and the wind directions; and are summarised in an annual report addressed to the Punjab Government.

It is noteworthy that the rain-fall reported by the land revenue establishments, though observed with

rough instruments and by clerks on small pay, agrees well with the more detailed and scientific observations last described.

The rain-fall of the Punjab, like that of the North-West Provinces, is brought to it by wind currents from the east and south-east. A portion of the fall may be due to the south-west currents from the Indian Ocean; but so much of these as contribute to the Punjab rain-fall seem to strike the eastern currents at a point east of Delhi, and are deflected by and added to the latter.

It is a proverb all over the Punjab that the east wind brings rain. This is said both of the autumn and winter rains. I gather from Dr. Neil's report that his observations do not corroborate this fact in respect of the winter rains. But the fact is notorious, even in winter, that rain comes with the east wind; and I have no doubt that in due time meteorological observations will confirm and explain it.

The province has two well-marked rainy seasons; the autumn rains, which usually commence at the end of June and last into the middle of September; and the winter rains, which occur principally between January and March.

The average annual fall in each district, and more especially the average amount of the autumn fall, depends mainly on its distance from the base of the Himalayan tracts, which stretch from end to end of the province on its north-east side. The following table illustrates this. It shows the way the rain-fall of each doab or delta decreases as we recede from the hills:—

CHAP. I. QN. 1.

PUNJAB.

Major Wace.

From EAST				To WEST.							
BETWEEN THE RIVERS JUMNA AND BEAS.				BETWEEN THE RIVERS BEAS AND RAVI.		BETWEEN THE RIVERS RAVI AND CHENAB.		BETWEEN THE RIVERS CHENAB AND JHELUM.		BETWEEN THE RIVERS JHELUM AND INDUS, AND DOWN WEST BANK OF INDUS RIVER.	
STATION.		Distance from Himalayan base.	Rain-fall.	STATION.		Distance from Himalayan base.	Rain-fall.	STATION.		Distance from Himalayan base.	Rain-fall.
		Miles.	Inches.			Miles.	Inches.			Miles.	Inches.
Narasingarh	10	44		Dera	0	54		Pathankot	0	54	
Umballa	26	35		Hoshiarpur	32	34		Gurdaspur	25	31	
Pipli	56	26		Jullundur	55	30		Batala	44	27	
Kaithal	70	18		Nakodar	72	26		Amritsar	65	23	
Hissar	135	17		Ferozepore	112	20		Kasur	110	22	
Sirsa	135	14		Muktsar	144	13		Chiniot	140	22	
								Dipalpur	170	8	
								Montgomery	200	9	
								Mooltan	290	6	
								Sialkot	25	39	
								Daska	40	30	
								Gujranwala	55	26	
								Hafizabad	80	20	
								Sharakpur	100	19	
								Jhang	170	10	
								Gujrat	30	29	
								Phalian	55	26	
								Bhera	80	16	
								Shahpur	110	13	
								Abbottabad	0	46	
								Haripur	16	36	
								Rawalpindi	32	32	
								Fatahjang	50	-	
								Talagang	100	14	
								Mianwali	145	10	
								Dera Ismail Khan.	200	8	
								Leiah	260	8	
								Muzaffargarh	310	6	
								Rajanpur	400	-	

CONDITION OF THE COUNTRY AND PEOPLE OF INDIA.

CHAP. I. QN. 1.
PUNJAB.
Major Wace.

The winter rains contribute but a small portion of the total annual fall. In the Delhi and Umballa divisions they are usually 4 inches out of 30; in the submontane tracts of the Jullundur, Amritsar, and Lahore divisions they are 5 out of 30 and 35; or in the parts more distant from the hills 3 out of 20. In the northern part of the Rawalpindi division they increase to 7 out of 30. At Sirsa and Shahpur, far removed from the hills, they are 2 out of 13; and at Mooltan 1 out of 6. Yet owing to the low temperature of the winter, these small falls of rain in all but the southernmost portion of the province raise crops equal in value to those grown under the fierce sun and heavy rains of the autumn.

It is not possible to state exactly, or nearly exactly, how many inches of rain are needed in each month. On the other hand, the description of the years of scarcity which have occurred in the Punjab, and of the seasons at which rain is essential to each crop, or injurious to it, go far to supply the information required. Briefly summarised, that information is as follows:—For the autumn (kharif) crop the most favourable conditions are falls of rain commencing at the end of

June and lasting, with breaks not exceeding a fortnight, into the middle of September. The total fall is not so important as the repetition of moderate falls at the intervals stated.

The most unfavourable conditions consist in the failure of the last half of the autumn rains in July and August.

The seasons in the Punjab are so adjusted that the later rains of the autumn (August to October) both ripen the autumn crops and prepare the ground for the rabi sowings. If these rains fail, two crops are lost at one blow. Both in 1860 and 1868 it was this which caused the famine. The natives say that the loss of the kharif harvest by itself does not cause famine, but that famine always comes in with the kharif, and goes out with the kharif. That is to say, the kharif may fail owing to short rains at the sowing time; but if the later rain fails absolutely, the rain which both ripens the autumn millets and on which the wheat is sown, the country loses at one blow a year's food supply. In the same way famine goes out with the kharif, because these late autumn rains bless the country with two crops at once.

Dr. Neil.

January.—This is the coldest month of the year throughout the Punjab, and usually more so than November and December. The winds usually blow from north-westerly directions, but, as in the cold season generally, vary greatly.

The rain-falls during this month, as indeed during the cold weather generally, are due to local influences, local areas of low pressure, whither wind currents of different degrees of saturation and different temperatures blow and mingle. A good instance of this was shown in January 1874, on the 21st and 22nd of the month. On the north-west frontier the wind had been blowing previously mostly from northerly and easterly directions; while on the north-eastern boundary, from below and through the district of Ludhiana, the wind came from westerly sources. These currents, impinging and uniting, deflected towards the more eastern districts, and there, the regions being colder, precipitated their moisture.

A cold wind from the hills meeting a warmer current from the plains will serve to produce a depression of temperature with consequent condensation of moisture, and a continuance of this will bring the moisture below the dew point or point of saturation, and a fall of rain will be the result. The range of rain-fall for January extends from a maximum of four inches to a few drops. The submontane districts are usually the most liberally supplied, from causes described above.

February.—This month is warmer by an average of 5° or 6° than January. The winds, though variable, blow mostly from northerly and westerly directions, and the rains are due mostly to the same causes as I have mentioned in my remarks for the previous month. The largest rain-falls occur in the submontane districts. The largest fall during this month in Lahore (4·67 inches) occurred in 1877; so also in Rawalpindi and in Siālkot in the same year. In the more eastern districts the fall does not usually reach one inch, and the same remark applies to the more southern districts.

March.—The mean temperature of this month exceeds that of February usually by about seven degrees. The temperature in the sun's rays begins to increase greatly. The winds, still variable, begin to blow more frequently from easterly sources as the heat of Northern and Western India begins to increase, but northerly and westerly currents still prevail. The average rain-fall at Lahore rarely exceeds two inches; and seldom, indeed, reaches that amount. During this month of 1868 and 1869 the rain-fall in the submontane districts and a few others was very considerable, and was due to a prevalence of wind currents blowing towards the great north-eastern boundary, and being there met by counter-currents. In March

1871, these same districts had very little rain, and I account for this by the fact that the westerly currents were so powerful that they carried their moisture far into the mountains beyond the districts noted. The average amount of rain in the more southern districts, such as Delhi, Gurgaon, Hissar, does not usually exceed an inch. In the submontane districts the fall is more plentiful, from the reasons given above, and in the western and north-western districts the fall is also usually tolerably plentiful. This will depend of course greatly upon whether the area of low pressure may shift towards them, and thus cause a rush of wind currents in that direction.

April.—The mean temperature of this month exceeds that of March by about 11°. The wind begins to assume more southerly directions, but is still variable. The rain-fall varies very much throughout the province. In the more southern districts and on the north-western frontier it seldom exceeds one inch, and in many places does not even reach that amount. The north-eastern districts usually fare better, though occasionally very badly.

May.—This month has a mean increase of about 10° over that of April. The amount of rain varies very much in different years during this month in the Punjab. In the years 1869, 1870, 1871, this month was almost rainless, and in 1874, 75, 76, 77, very little fell, at random periods. In the years 1867 and 1872, and notably in the present year, the falls for this month have been very considerable. On turning to my report for 1869, I find the following remark:—"The most remarkable difference in the amount of rain is observable in May as compared with that of the same month for the two previous years, during which it so happened that a certain amount of rain fell in almost every district in the province. The barometer showed greater fluctuations of pressure during the month in 1867 and 1868." It is to be observed that the month of March of 1869 was unusually rainy which, due, as the cold weather rains are, to local influences, principally accounts, partly at least, for the scanty fall in the May following.

Turning to the table of "Directions of Wind," for 1869, I find that the winds were with unusual frequency easterly, as for example at Siālkot, and this will account for the absence of rain in the submontane districts. The wind currents were blowing towards the area of low pressure. Turning to the report for 1872, I find that westerly currents were more prevalent; the area of low pressure had therefore been more eastward.

June.—This is the hottest month of the year. The amount of rain which falls during this month is subject to very great variation. In the report for June 1873, I made the following observations:—"It is

"most interesting to compare this month's (June 1873) weather results with those of the same month for the past four years." In my report for June 1871, I wrote as follows:—"The rain-fall during this month was unusually large in the eastern and south-eastern districts and in the hills. The cause of this was the almost entire prevalence of the south-east winds. These south-east rain-bearing winds, blowing as they did along the great mountain boundary of the Himalayas, had most of their moisture precipitated to the east of 74° longitude. The south-west winds to the west of this, on the other hand, meeting seldom with any resistance from counter-currents, blew onwards towards the north-western boundary of the province, over a large tract of arid country, and had little moisture left in them by the time they reached the great Sulimān range as south-eastern deflected currents. The districts north of the 33rd parallel fell short of their usual supply of rain, and it is most likely that, with the same predominance of south-easterly winds, this state of matters will always maintain, as it will also in the case of districts lying to the west of 74° longitude. As the Gangetic current waxes stronger or otherwise over the south-western, the greater or less will be the fall of rain in June."

Quoting still from the report of 1873, "The table of results shows at a glance in how far the above remarks are confirmed by subsequent observation. Take for example Ludhiāna. In June 1871, when east and south-east prevailed, there was a fall of over 10 inches of rain; while in 1873 for the same month there was a fall of only a fraction of an inch. With the other years for the same month there will be found shades of difference which correspond to the prevalence of the rain-bearing currents or otherwise. The same remark applies to Siālkot, Lahore, and Rawalpindi.

July.—Owing to the rains this month is slightly cooler than June, and the daily range of temperature is less. As a general rule, the monsoon rains do not set in in the Punjab before the end of the first week of this month. At all events this is usually the case with the districts north of the 30th parallel. As regards the amount of rain which the province will receive during this month and the following, we have tolerably definite and trustworthy data at command. Depending as the rain-fall is upon monsoon influences, and recognising the fact that two rain-bearing currents, south-western and south-eastern, affect the eastern and northern parts of the Indian Peninsula, we have only to discover by observation whether the current is more or less powerful than the other. Of the two monsoon currents, the south-east or Gangetic current is the one upon which the Punjab depends most for rain. In my report for July 1873, I wrote as follows:—"A considerable amount of rain fell in most of the eastern districts, and the obvious cause was the prevalence of the rain-bearing currents from the east and south-east."

The fall was observed to be most copious in the more eastern districts, in some of which the fall nearly doubled the mean of previous years for the same month. If we compare the falls of July 1869 and 1873, we notice that north of latitude 30° the fall for the former period far exceeded that of the latter, while in the districts south of that parallel, the rains were, in 1869, comparatively scanty. Thus, at Delhi the fall in July 1869 was only 6·5 inches; while that

of July 1873 in the same station was nearly three times that amount. On examining the wind charts for these periods, we find that during the early part of the month of 1869 the winds blew most frequently from westerly directions; and it was not till the middle of the month that rain fairly set in with the change of wind to south-east. Again, as regards July 1874, I wrote:—"Had the south-west monsoon been more powerful, less rain would probably have fallen in the districts north of the 30th parallel and to the east of the 73rd degree of longitude, inasmuch as to the west of this lies a dry arid country, in which moisture (in the south-west wind) is absorbed."

August.—The temperature of this month differs but little from that of July. The rain which falls depends of course upon monsoon influences. In this month of 1868, there was a great scarcity of rain in the more southern, and in many of the submontane districts. Take, as example, Delhi and Siālkot. In 1867 Delhi had 7·4 inches in this month, and Siālkot 26·2; whereas in 1868, for the same period, Delhi had only 0·3 inches, and Siālkot 9·7. These results were due entirely to the greater frequency and force of the easterly and south-easterly currents in the former period than in the latter.

September.—The weather phenomena for this month are also under monsoon influences. The south-easterly currents begin by this time to lose their force, and the south-west monsoon prevails. In my report for 1873 I wrote as follows:—"The south-west monsoon from the Arabian Sea meets with little obstacle, as it blows over the comparatively arid plains to the east of the Indus river; and as it blows onwards towards the great Himalayan boundary, the failing south-east current is unable to deflect it. These facts show why there are later rains in the north-eastern districts than in those further to the south. A reference to a map will show that the remaining moisture of the combined currents gets dammed up, as it were, against the great mountain boundaries, and falls as rain in the valley bounded on the west by the great Sulimān range, on the north by the hills north of Peshāwar, and to the east by the continuation of the Himalayan range."

October.—During the early part of this month the monsoon breaks up, and a little rain falls throughout the province, sometimes in considerable quantity in the submontane districts. This fall sometimes does not occur till about the middle of the month. Westerly winds are most frequent. The area of lowest pressure, about this period, seems to be along the Indus valley.

November.—This is the least rainy month of the year in the Punjab. A little falls occasionally in the north-western area of low pressure. The winds are variable, but most frequently westerly.

December.—The winds are very variable during this month, but westerly currents are most frequent. A little rain usually falls about the end of the month, called the Christmas rains.

The following table is intended to show how much the mean temperature of each month differs in increase or decrease from that of its predecessor. A glance at such a summary will show that during the first six months, January to June inclusive, the greatest monthly increase of temperature occurs in April and May, and the greatest decrease during the latter half of the year, in November. January is the coldest month, and June the hottest.

STATIONS.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
Lahore	53·96	60·35	68·74	80·96	89·14	94·39	90·31	89·68	86·41	77·93	55·21	56·25
Rawalpindi	50·75	55·83	63·59	74·56	85·48	93·27	90·32	87·54	83·76	74·	61·90	53·60
D. I. Khan	52·77	58·75	67·02	78·57	88·77	95·06	93·48	90·83	87·08	75·74	63·35	54·41
Siālkot	54·09	59·72	67·19	78·71	88·78	93·11	88·33	87·16	85·65	76·96	63·88	54·73
Mean of the four stations	52·89	58·66	66·63	78·20	88·04	93·96	90·61	88·80	85·73	76·16	63·59	54·75
Mean difference between each month	..	+ 5·77	+ 7·97	+ 11·57	+ 9·84	+ 5·92	- 3·35	- 1·81	- 3·07	- 9·57	- 12·57	- 8·84

NORTH-WEST PROVINCES AND OUDH.

RAIN-FALL OF THE N.-W. PROVINCES AND OUDH.

The first subject to be treated will be the history of rain-fall observations in the North-Western Provinces, and their general character as regards accuracy. Then will follow the two chief sections of the report, dealing with the detailed distribution of rain-fall in space and in time respectively. The tables showing the average monthly and annual rain-fall at a large number of stations will be relegated to an appendix.

History of Rain-fall Observations in the N.-W. Provinces and Oudh.—The first attempt at a systematic record of the rain-fall of the North-West Provinces was made in the year 1844. In earlier years various independent observers from time to time registered the rain-fall and other meteorological phenomena observed at the stations where they resided, but their observations were generally for such short periods, and so desultory in character, as to be of very little value in subsequent investigations. A notable exception to this general rule was the meteorological register kept for two years at Benares by Mr. James Prinsep, and published in the volume of the *Asiatic Researches* for 1823. Mr. Prinsep was able to deduce from his observations more accurate values for the temperature, pressure, and humidity of the air, and for the daily and annual ranges of the barometer and thermometer at Benares, than were given by any subsequent observations until a regular meteorological observatory was established at that station in 1867. As regards rain-fall, however, a period of two years is much too short to allow a correct average to be deduced from the observations, and therefore Mr. Prinsep's figures can furnish little or no information that would be of value in drawing up this report.

After the great famine of 1838, the attention of the Board of Revenue appears to have been directed to the desirability of obtaining numerous observations of rain-fall from every district in the province, to enable the members of the Board to estimate the probable character of the crops of each year, and the revenue-paying power of the cultivators. With this object in view, a rain-gauge was set up in the beginning of 1844 at every tahsil or revenue subdivision of a district. A year or two later the number of gauges was increased considerably, one being placed at nearly every police station or thana. Thus organized, the system of observation continued in operation down to the year of the mutiny. The registers were sent into the office of the Board of Revenue, and were published, either in full or as an abstract, in the Board's annual reports. An abstract of all the observations taken between May 1844 and October 1850 was also published in a separate form, but the date of publication (probably about 1853 or 1854) is not stated.

During the mutiny year, 1857, and the three following years, owing to the disturbed state of the country, no record of the rain-fall was kept at any of the revenue stations in the plains, and the records for the year preceding the mutiny, 1856, seem, as a rule, to have been lost. From the Himalayan districts of Kumaun and Dehra Dun, to which the rebellion did not extend, we have a few registers for the years 1856-60, and these help to fill up the break of four or five years which exists in the registers for all the other stations.

Rain-fall observations were re-commenced generally over the North-Western Provinces in 1860, and in Oudh a beginning was made a year or two later. At first gauges were set up at a few of the police stations as well as at the tahsils; but experience having shown that the observations made by the police were generally of little or no value, they were very soon abandoned. Abstracts of the weekly rain-fall returns for 1860-61, and the two following years, were published by the Board of Revenue; but many of the figures for these years were obviously inaccurate, and it was only about the beginning of 1864 that fairly

trustworthy observations from the outlying stations began to be received. Since then weekly returns of rain-fall have been regularly published in the *Government Gazette*. In Oudh many of the observations continued to be of a doubtful character three or four years longer, but in 1868 they began to be checked by Dr. Bonavia, of the Oudh Department of Science, and since then they have been much more accurate.

In drawing up the tables of average rain-fall given in the appendix, the records for the North-Western Provinces have been assumed to begin with 1864, or the first year after 1864 in which the observations appeared to be fairly accurate. Similarly, in Oudh, the records are supposed to commence in 1868, those of earlier date being ignored on account of the numerous errors they contain. In the case of the sudder station of each district in the North-Western Provinces, the whole of the observations having been taken under the immediate supervision of the Collector, may be considered equally accurate, and for these stations the average rain-fall for the whole period of observation, as well as for the fifteen years (1864-78), is given in the table. It will be observed that in very few cases is there any considerable difference between the two averages.

Rain-gauges used.—Before proceeding to discuss the distribution of the annual rain-fall over the provinces, it may be well to state what is known regarding the accuracy or inaccuracy of the gauges by which the rain-fall has been measured. What form of gauge was employed before the mutiny I do not know; but since then almost all the instruments in use have been constructed on the principle known as Fleming's. A gauge of this kind consists of a wide conical funnel, ending below in a cylindrical tube of smaller diameter. In this tube moves a float carrying a graduated rod, each division of which corresponds to a tenth of an inch of rain. The instruments have been made at the Roorkee workshops, and, as a rule, they are capable of giving fairly accurate measurements if properly used. One defect they all have is that they require a certain quantity of water to raise the float and bring the zero point of the measuring rod up to the fiducial mark. This quantity varies with each instrument, and, in most cases, no allowance has been made for it. Another cause of error is the circumstance that the rod is graduated only to tenths of an inch, and the nearest division simply is recorded at each reading. Light falls of rain under .05 of an inch are therefore neglected; and, as these are by no means rare, especially in the cold weather months, the result is that, on the average, the observed figures are always three or four per cent. below the truth.

No attempt has been made to correct this error in the observations; but the tahsil returns, with all very improbable figures carefully weeded out, have been taken as they stood. In order to obtain more correct averages than those given, seven per cent. might be added to all the figures for the months from November to May, and three per cent. to those for the remaining months. Neglecting this small error, and assuming that the observations have been taken with a moderate degree of care, one sees that the data furnished by the 233 stations, situated on the plains within the bounds of the province, and whose rain-falls are given in the appendix, are sufficiently numerous to afford as exact a knowledge of the distribution of rain over the plains districts of these provinces as could at present be obtained for any European country of equal area.

SECTION I.—DISTRIBUTION IN SPACE.

Rain-fall Maps.—The best way to obtain a correct notion of the geographical distribution of rain-fall, temperature, or any other meteorological phenomenon, is to take a map and mark on it the figures recorded at every observing station, and then to sweep lines through all those places where the figures are nearly equal. In this way the curves on the maps accom-

panying this report have been drawn, each line passing through places whose rain-fall is represented by the figures attached to the line. In drawing the lines of equal rain-fall, two or three stations have been left out of account, because their rain-fall totals differ more than ten per cent. from the averages for the surrounding stations, while no obvious reason, such as proximity to a mountain, can be assigned for such a difference. The annual totals for these stations are marked with a note of interrogation. The figures are always considerably less than the means for the surrounding stations, and the error is probably due to the observers neglecting to record light falls of rain.

A map constructed in this way represents as accurately as possible the average distribution of the rain-fall over a plain country like the Doab, Rohilkhand, and Oudh, even when the observing stations are 20 or 30 miles apart; but in hilly countries, such as Bundelkhand, Baghelkhand, and the southern parts of the Mirzapur district, the stations would require to be very numerous, in order that the map might be anything better than a rough approximation to the truth. In a mountainous country like Kumaun and Garhwal, any attempt to draw detailed isohyetic lines would be only misleading. The lines of equal rain-fall on these maps are accordingly confined to the plains and the hill country south of the Ganges; the rain-fall figures for each of the Himalayan stations being printed separately, close by the name of the station.

The earliest rain-fall maps for the North-Western Provinces appear to have been drawn up in 1864, and were published with the report of the Board of Revenue for 1863-64. In the *Punjab Government Gazette* for the 19th December 1863, Mr. E. Prinsep, the Settlement Officer of Ambala, had published a paper in which he showed that the districts of the Punjab might be arranged in zones of nearly equal rain-fall, parallel to the Himalaya; the zone of heaviest rain lying along the foot of the mountains, and that of least rain bordering on the Bikanir desert. At the suggestion of Mr. G. Batten, then Secretary to the Board, two maps were drawn up to show whether anything like a similar distribution of the rain-fall obtained in these provinces,—one representing the rain-fall of 1863-64, and the other the average rain-fall of nine years (1844-45 to 1852-53). The Board's report says that no satisfactory conclusion could be drawn from these maps regarding Mr. Batten's suggestion, because the data were not perfectly trustworthy. Owing to the absence of observations from Oudh, which lies in the heart of the North-Western Provinces, as well as to the way in which the maps were drawn and coloured, it would have been very difficult to see whether there was any truth in Mr. Batten's surmise, however accurate the observations might have been. The mistake in colouring consisted in giving every district the same tint throughout, as if its rain-fall were everywhere the same. Thus the parallelism of the rain-fall zones with the Himalaya was completely masked, because

the district boundaries seldom or never run parallel to the mountains.

Geographical Distribution of the Annual Rain-fall.—A glance at the map for the whole year will show that Mr. Prinsep's conclusion regarding the distribution of rain-fall in the Punjab may be extended (as has already been shown by General Strachey and other writers) to the North-Western Provinces and Oudh. In the western half of the area the lines of equal rain divide the Doab and Rohilkhand into strips which would be nearly parallel to the mountain axis were it not that they generally widen out towards the east, and contract as they extend westwards. This is but another way of saying that the amount of the annual rain-fall varies, not only with distance from the Himalaya, but with distance from the warm sea from which the moist winds usually blow. To the south of the Jumna the rain-fall again increases. The cause of this increase will be discussed further on.

In the eastern half of the provinces, however, the parallelism of the rain-fall zones with the Himalaya can only be traced in the districts lying to the north-east of the Ghagra river. An irregular quadrilateral, occupying the lower parts of the drainage areas of the Gumti and Sai rivers, and extending north-westwards nearly as far as Lucknow and Bara Banki, has an average rain-fall over 40 inches, while the rain-fall of the greater part of the Fyzabad district on the north-east and of the Azamgarh and Ghazipur districts to the east, as well as that of south Behar, is under 40 inches. Immediately to the west of this area, in the Rae Bareilly, Unao, Fatehpur, and Cawnpore districts, the rain-fall averages only about 30 inches, while farther west, in the districts of Etawah and Mainpuri, it is over 30 inches. It thus seems as if a portion of the rain that would fall in Rae Bareilly, Unao, Fatehpur, and Cawnpore, were the easterly winds constantly blowing, is compelled for some reason or other to fall 50 miles to the east of these districts.

South of the Jumna the rain-fall again increases, and in the eastern-half of the map of the lines of equal rain will be seen to run generally parallel to that river, or its continuation the Ganges. In the district of Shahabad, between the Ganges and the Son, there is a long narrow strip of country, with an annual rain-fall of over 45 inches. This is probably due to the influence of the Kaimur hills which have here to be surmounted by the south-easterly winds from the Bay of Bengal. Farther to the west, in south Mirzapur and Rewah, the prevailing winds of the rainy season are westerly, and the heaviest rain falls on the north-west side of the Kaimur range.

The decrease of rain with distance from the Himalaya up to a certain limit, and its increase beyond that limit, as well as the gradual decrease on passing from south-east to north-west, are perhaps more clearly seen when the map is divided into equal rectangular sections by lines parallel and perpendicular to the Himalaya and the average rain-fall of each section is calculated as in the following table.

MEAN ANNUAL RAIN-FALL of the NORTH-WESTERN PROVINCES and OUDH in ZONES parallel to the HIMALAYA.

Distance, in miles, from the Foot of the Hills.	On Cross Strips through										
	Saharanpur.	Bijnor.	Moradabad.	Bareilly.	Shahjahanpur.	Kheri.	Bahraich.	Fyzabad.	Basti.	Parauna.	Mothari.
0 to 25	Inch. 40.7	Inch. 46.6	Inch. 49.5	Inch. 57.7	Inch. 64.8	Inch. 66.0	Inch. 64.5	Inch. 47.4	Inch. 46.7	Inch. 46.6	Inch. 46.9
25 " 50	31.0	36.8	40.5	46.3	46.8	46.0	44.5	47.4	46.7	46.6	46.9
50 " 75	28.9	28.8	36.6	42.0	38.4	36.4	40.2	40.5	41.0	41.7	44.8
75 " 100	23.5	23.2	28.3	32.2	33.7	33.7	37.0	42.5	38.4	37.6	43.8
100 " 125	25.5	23.5	24.6	30.9	29.5	31.3	33.9	35.0	40.0	36.4	38.6
125 " 150	—	24.5	23.7	30.4	29.9	31.3	31.3	37.3	35.7	38.0	38.5
150 " 175	—	—	26.0	27.6	32.4	31.2	34.0	35.2	39.5	38.2	—
175 " 200	—	—	26.0	27.0	29.7	31.0	38.5	39.8	41.7	41.6	—
200 " 225	—	—	—	32.8	30.1	32.9	38.8	48.5	63.6	44.6	—
225 " 250	—	—	—	—	30.4	35.1	—	—	—	—	—
250 " 275	—	—	—	—	33.4	?	—	—	—	—	—
275 " 300	—	—	—	—	37.1	38.6	—	—	—	—	—
300 " 325	—	—	—	—	37.8	41.1	—	—	—	—	—

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The heavy rain in south-eastern Oudh is indicated by the figures for the strips through Basti and Fyzabad at distances of 75 and 100 miles from the hills.

Reasons of the observed Distribution.—The causes of the observed distribution of rain over the upper half of the valley of the Ganges are not far to seek or difficult to understand. In the first place, the rain-fall gradually diminishes on proceeding up the valley from south-east to north-west, because the prevalent rainy winds are south-easterly. These winds come from the Bay of Bengal branch of the south-west monsoon current, and are in fact that portion of the current which is deflected from its normal course by the mountains north of Bengal, and by the indraught towards a region of low atmospheric pressure that occupies the centre and south of the Punjab during the rainy season. Since these winds are constantly parting with their moisture during their passage inland, it follows that the farther we proceed from the sea in the direction of the wind's motion the less will the rain-fall become.

Next it must be borne in mind, that though rain is sometimes precipitated from the lowest strata of the

air, it more usually falls from clouds formed at a considerable height, and that in deducing the probable character of the rain-fall of any locality from a knowledge of the prevailing winds, the upper as well as the lower currents of the atmosphere must be considered. Now although the prevailing direction of the winds at stations on the plains near the foot of the Himalaya is nearly parallel to the axis of the range during the rainy season, it is very different at considerable elevations. At stations of 6,000 or 7,000 feet elevation above sea level, the mean direction of the wind for each month varies from west to south-east; the average direction for the whole year being nearly at right angles to the general line of the mountains. At greater elevations the winds are constantly south-westerly. At Dehra, 2,250 feet above the sea, or 1,400 feet above the neighbouring plain, the winds are north-westerly during a portion of the dry season; but in the rainy months they are there also at right angles to the direction of the mountain range. The directions of the mean winds for each month at several hill stations are given in the next table.

MEAN WIND DIRECTIONS AT HIMALAYAN STATIONS.

Station.	Elevation.	January.	February.	March.	April.	May.	June.
	Feet.						
Dehra - - -	2,250	S. 72° W.	S. 67° W.	S. 79° W.	S. 74° W.	S. 58° W.	S. 66° W.
Ranikhet - - -	6,080	N. 89° W.	S. 62° W.	S. 52° W.	S. 66° W.	S. 63° W.	S. 69° W.
Darjiling - - -	6,930	S. 50° W.	S. 65° W.	S. 67° W.	S. 68° W.	S. 51° W.	S. 14° W.
Chakrata - - -	7,070	S. 29° E.	S. 56° E.	S. 20° E.	S. 57° W.	S. 42° W.	S. 53° W.
Leh - - -	11,570	S. 8° W.	S. 11° W.	S. 28° W.	S. 22° W.	S. 40° W.	S. 52° W.

Station.	July.	August.	September.	October.	November.	December.	No. of Years' Observations.
Dehra - - -	S. 67° W.	S. 56° W.	N. 61° W.	N. 64° W.	N. 78° W.	N. 89° W.	9-10
Ranikhet - - -	S. 77° W.	S. 72° W.	S. 61° W.	S. 53° W.	S. 56° W.	S. 60° W.	6-8
Darjiling - - -	S. 12° E.	S. 13° E.	S. 23° W.	S. 48° W.	S. 38° W.	S. 38° W.	10.
Chakrata - - -	S. 51° W.	S. 55° W.	S. 50° W.	S. 28° W.	S. 29° W.	S. 18° W.	6-8
Leh - - -	S. 57° W.	S. 55° W.	S. 29° W.	S. 37° W.	S. 27° W.	S. 17° W.	4

A current of air cannot continue to blow against an obstacle like the Himalayan mountain wall without being forced to rise upwards, and the upward motion will not be confined to the immediate neighbourhood of the mountains, but will commence at some distance to windward. In this way all that portion of the summer monsoon current which lies more than 2,000 feet or so above the plain will generally be found flowing up a gentle incline towards the hills. Of the lower stratum, which usually moves in a direction parallel to the mountains along their base, portions are deflected upward by every projecting spur and ridge inclined more or less nearly at right angles to the main chain. And even in this region southerly and south-westerly winds are not uncommon, for it is only the *mean* wind direction which is parallel of the mountain axis. During the summer monsoon, therefore, the whole of the southern slope of the Himalaya, and a broad belt of the plain at its foot, are occupied by a system of ascending atmospheric currents. A mass of air cannot, however, ascend in the atmosphere without expanding, and it cannot expand without pushing aside other air and occupying its place. In doing this a quantity of heat equivalent of the work done disappears, and the temperature of the ascending air is lowered. By an easy deduction from the mechanical theory of heat, it may be shown that in this way the temperature of dry air would be lowered one degree Fahrenheit for every 183 or 184 feet of elevation. Moist air would be cooled rather more slowly, but still, in an ascending stream, it would very soon acquire a temperature so low that a portion of its moisture must necessarily assume the form of cloud and rain. This cooling, consequent on expansion in an ascending current, is usually the immediate cause of rain. Wherever the ascending movement is most rapid, provided the supply of

vapour be constant, there the rain-fall will be heaviest. Accordingly we find the greatest amount of precipitation along the lower slopes of the Himalaya, from which region the quantity diminishes towards the south-west because the ascensional movement becomes less and less rapid with distance from the obstacle. The amount of rain also diminishes on proceeding towards the inner and higher ridges of the chain, owing to the rapid exhaustion of the vapour. What the law of this diminution is will be considered further on.

Any other circumstance that tends to make moist air or vapour ascend will act as a cause of rain. In a perfectly still atmosphere over a sheet of warm water, aqueous vapour will constantly be formed, and by spontaneous diffusion will ascend until the air becomes saturated with vapour, and cloud or rain is generated. The saturation point is always reached first at some high level, whilst the air at the surface of the ground is still capable of taking up more moisture. The reason of this is that the temperature falls too rapidly on ascending to permit the vapour to attain the condition of equilibrium that would finally be reached by diffusion; because the quantity of moisture required to satisfy the conditions of equilibrium at a high level is much greater than that which can exist as vapour at the temperature of the given elevation. Cumulus clouds formed in this way are frequently seen at the close of the rainy season, and about that time of the year a fine day often ends in a thunderstorm or other atmospheric disturbance, due to the recondensation of the water vapour raised by the action of the sun while above the horizon.

The latent heat given out during the precipitation of rain expands and diminishes the density of the air with which the vapour was mixed, and thus sets the whole mass ascending. This is followed by a further

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condensation of vapour, the liberation of more latent heat, an acceleration of the ascensional movement, and a strengthening of the indraught of air at the bottom. In this way rain-fall once commenced tends to perpetuate itself, provided the supply of vapour be kept up. The summer monsoon current is thus maintained for a short time after the thermal focus of the Indian continent has travelled to the south of the region toward which the winds blow, and the force and persistency of this atmospheric current are much greater than the mere difference of temperature between sea and land observed at the surface of the earth would lead us to expect. In the same way the torrential rains and violent winds of a cyclonic storm are supposed to be produced by the rapid condensation of vapour. A fuller account of the functions performed by rain-fall in atmospheric physics will be found in Mr. John Eliot's cyclone reports, and in his report on the meteorology of India in 1877.

The increase of rain-fall to the south of the Jumna can now be explained. It is due partly to the action of the Bundelkhand hills and those of Rajputana in causing the air to ascend, but perhaps chiefly, as Mr. Eliot has suggested, to the atmospheric eddies or minor cyclones produced by the interaction of the easterly and westerly winds from the Bay of Bengal and the Arabian Sea, which meet along this line. This is shown by the unsteadiness of the winds in the neighbourhood of the Jumna during the monsoon months, south-easterly and north-westerly winds being nearly equally frequent.

Thus, at the following stations along the Ganges-Jumna, the per-centages of the winds that blow from the mean directions are very small:—

Stations.	Mean directions— June, July, August, and September.	Steadiness per cent.	Years' Observa- tions.
Benares - - -	S. 16° E.	5	10
Chunar - - -	S. 27° E.	7	2
All habad - - -	N. 22° W.	7	8
Agra - - -	N. 40° W.	10	7

Contrasted with these we have, for the region of easterly winds north of the Ganges, the following figures which indicate much greater steadiness:—

Stations.	Mean directions— June, July, August, and September.	Steadiness per cent.	Years' Observa- tions.
Gorakhpur - - -	S. 77° E.	46	8
Fyzabad - - -	E.	58	7
Lucknow - - -	S. 42° E.	14	6
Bareilly - - -	S. 74° E.	21	7
Fatehgarh - - -	S. 18° E.	17	4
Meerut - - -	N. 26° E.	26	5
Roorkee - - -	S. 30° E.	19	7

To the south of the Jumna also, in the region swept by south-westerly winds from the Bombay coast, the per-centage indicating the steadiness of the wind is far greater than along the line of that river, as shown in the following table:—

Stations.	Mean directions— June to September.	Steadiness per cent.	Years' Observa- tions.
Jhansi - - -	N. 88° W.	21	10
Saugor - - -	S. 71° W.	61	8
Jabalpur - - -	S. 85° W.	47	8
Sutna - - -	N. 64° W.	45	3

The zone in which the opposing winds meet is constantly shifting, but there can be little doubt that the principal eddy thus formed most frequently occupies the quadrilateral bounded by lines joining Allahabad, Benares, Sultanpur, and Rae Bareilly, and that the excessive rain-fall over the north-eastern half of this

region, as compared with the districts to the eastward at the same distance from the Himalaya, is due to the indraught and ascension of moist air in the feeble cyclonic vortex thus formed.

The cyclonic character of the winds of this region throughout the summer monsoon is clearly shown by the resultant directions E. at Fyzabad, N. N. E. at Rae Bareilly, N. E. at Partabgarh, N. N. W. at Allahabad, S. by E. at Benares, and E. by S. at Gorakhpur. The relations of wind to rain-fall have only been worked out in detail for one station, Benares.

The direction from which rainy winds most frequently blow at Benares is due east. Next in order of frequency come north-east, due west, south-east, south-west, and north-west, rain least frequently accompanying winds from the north and south. Winds from these latter directions blow very seldom, whilst easterly and especially westerly winds are often felt. Consequently we find that rain accompanies a south-easterly wind one day in three, an easterly wind two days in seven, a north-east wind one day in four, a south-west wind one day in five, a south wind one day in six, a north or north-west wind one day in seven, and a westerly wind only one day in 13. The average rain-fall of the 10 years, 1867-76, was distributed under the principal wind directions as follows:—

	Inch.
North - - -	1.21
North-east - - -	5.99
East - - -	9.37
South-east - - -	4.84
South - - -	0.46
South-west - - -	4.57
West - - -	8.47
North-west - - -	4.49
Calm - - -	2.51

From this it appears that the ratio of the rain brought by westerly winds to that which comes from the east is much greater than would be expected from the relative frequency of rainy winds from these quarters. In fact the individual falls of rain are more than half as heavy again when the wind is westerly as when it is easterly. The average daily rain-fall when the rainy wind blows from each of the eight principal points of the compass is the following:—

	Inch.
North - - -	0.684
North-east - - -	0.557
East - - -	0.590
South-east - - -	0.560
South - - -	0.655
South-west - - -	0.684
West - - -	0.880
North-west - - -	0.885

The excessive precipitation with westerly and north-westerly winds is doubtless due to the circumstance that, in the rainy season, such winds only reach Benares when there is a cyclonic circulation of the air round a region of low barometer and heavy rain-fall in the valley of the Gumbi river to the north.

The relations of wind to rain-fall at Benares being thus affected by the proximity of the station to the region of heavy rain in Jaunpur and south-eastern Oudh, it would be very desirable to know what these relations are at places further to the west,—for example, at Lucknow, Agra, or Roorkee. Sufficient materials already exist for the discussion of the question as regards some of these places, but I have not yet been able to work them up.

Average Rain-fall of the Province.—People often ask what is the average rain-fall of the North-Western Provinces, or what was the rain-fall of last year. Such a question is not very easily answered offhand. Sometimes the answer given is the simple mean of the rain-fall totals for all the observing stations, sometimes the mean of the averages for the several districts, and often the mean of the divisional averages; these in turn being the averages of the averages for

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all the districts in each division. Examples of all these ways of calculating the average rain-fall of the province might be quoted from official reports.

The first method will obviously give too low a result, because rain-gauge stations are numerous in the dry districts of the Meerut and Agra divisions, and few and far between in the rainy districts of the Benares division and the north of Oudh. The second might be expected to give a better result, but still there would be a large probable error owing to the very unequal areas of the districts. By the third method the doubt would be increased, because the divisions are by no means equal in area, and the number of these units is much smaller than that of the districts. In fact, to obtain a correct average for the whole province, the total area should be divided into a number of portions so small that the rain-fall of each would be the same in every part. The area of each small portion should then be multiplied by its rain-fall, and the sum of the products divided by

the total area. To perform this operation would of course be practically impossible, but a close approximation to the same result may be obtained by adding together the averages for all the equal sections given in the table on page 5 (counting only such rectangular sections or portions of these as are contained within the provincial boundary), and dividing the sum by the number of sections. The average for the plains districts, including the native territory of Rampur, and such Native states in Bundelkhand as are more or less completely surrounded by British territory, thus determined, is 37·6 inches. Another accurate method, the details of which are given in the next table, consists in taking off from the map by means of a planimeter the area of so much of each strip of country bounded by lines of equal rain-fall as lies within the province, multiplying the area of each strip by the arithmetical mean of the figures attached to the two boundary lines, and dividing the sum of the products by the sum of the areas.

MEAN RAIN-FALL of the PROVINCE as measured from the RAIN-FALL MAP.

Strip.	Area—square miles.	Mean Rain-fall—inches.	Product.
Under 25 inches -	4,333	22·5	97,492·5
From 25 " to 30 inches -	12,113	27·5	333,107·5
" 30 " to 35 " -	20,648	32·5	671,060·0
" 35 " to 40 " -	21,761	37·5	816,037·5
" 40 " to 45 " -	19,949	42·5	847,832·5
" 45 " to 50 " -	10,379	47·5	493,002·5
Over 50 " -	4,672	57·5 (?)	268,640·0
Total -	93,855	37·58	3,527,172·5

The average annual rain-fall of the whole province, with the exception of the Himalayan districts, determined in this way is 37·58 inches—a result that agrees very closely with the other. For the hill districts the data are much too few to afford any legitimate ground for constructing an average. Leaving these out of account, we find that the 233 plains stations within the bounds of the province give a simple average of only 35·2 inches, and this is, as we have anticipated, a good deal less than the true average.

The district and divisional averages, calculated in the usual way, are the following:—

	Inches.	Inches.
Saharanpur -	41·60	
Muzaffarnagar -	29·96	
Meerut -	25·61	
Bulandshahr -	25·64	
Aligarh -	24·68	Meerut division (excluding Debra Dun) - 29·50
Bijnor -	42·11	
Moradabad -	39·13	
Tarai -	47·78	
Bareilly -	44·75	
Budaun -	31·94	
Shahjahanpur -	36·06	Rohilkhand division (with the Tarai) - 40·30
Muttra -	24·36	
Agra -	25·42	
Mainpuri -	31·55	
Etawah -	32·25	
Etah -	29·37	
Farukhabad -	30·10	Agra division - 28·84
Jalaun -	30·18	
Jhansi -	34·47	
Lalitpur -	38·61	Jhansi division - 34·42
Cawnpore -	31·17	
Fatehpur -	34·02	
Hamirpur -	32·89	
Banda -	39·12	
Allahabad -	36·47	
Jaunpur -	40·37	Allahabad division 35·68
Mirzapur -	41·05	
Benares -	38·58	
Ghazipur -	37·66	
Azamgarh -	37·14	
Basti -	45·83	
Gorakhpur -	44·02	Benares division - 40·71
Kheri -	46·10	
Sitapur -	35·43	

	Inches.	Inches.
Hardoi -	31·64	Sitapur division - 37·72
Bara Banki -	37·71	
Lucknow -	34·36	
Unao -	31·93	Lucknow division - 34·67
Bahraich -	45·11	
Gonda -	42·70	
Fyzabad -	38·28	Fyzabad division - 42·03
Rae Bareilly -	33·20	
Sultanpur -	39·88	
Parthagarh -	34·22	Rae Bareilly division - 35·77
Mean of districts -	35·78	Mean of divisions - 35·96

It happens that the divisions and districts of large and small areas are nearly equally divided between the dry and wet portions of the province. The averages calculated on the bases of the districts and the divisions respectively therefore agree very closely when many years' observations are taken into account, and either result differs from the true average by less than two inches. It does not follow, however, that the mean of the district averages for any single year will approach as closely to the truth, for it may happen that the majority of the small districts will be drier than usual, and most of the large districts wetter, or *vice versa*.

The chief reason why the district averages give a result considerably below that obtained from the sections of equal area is the fewness or the entire absence of gauges in the rainiest parts of the Mirzapur, Gorakhpur, and Basti districts, and along the north of Oudh. The Rampur territory and portions of Chirkhari and other native states in Bundelkhand have also been included in the equal sections, but the rain-fall of these differs little from the average for the whole province.

SECTION II.—DISTRIBUTION IN TIME.

Rain-fall, like every other atmospheric phenomenon, is subject to two periodic variations, depending on the varying influence of the sun's heat, according to the different ways in which the portion of the earth's surface under consideration is presented to the sun by the diurnal rotation and the annual revolution of the earth in its orbit.

It may also be subject to a variation of long period, dependent upon a supposed inequality in the absolute

quantity of heat emitted from the sun at different times. Taking these three periods in order, the diurnal variation will be first considered.

Diurnal Variation.—The data available for the determination of the distribution of the rain-fall of the North-Western Provinces from hour to hour are too few to admit of any very accurate conclusions being drawn from them. During the three years 1876, 1877, and 1878, hourly meteorological observations were taken on the 7th, 14th, 21st, and 28th of each month at four stations—Roorkee, Agra, Lucknow, and Allahabad. The observations extended from mid-

night to midnight each day. During the three years there were thus 144 observations taken at each station for each hour except midnight. At this hour 288 observations were taken.

There were thus 14,400 observations altogether, and out of these rain was observed to be falling 473 times. Dividing the numbers for midnight by two, to make them comparable with the rest, we find that rain was observed 455 times out of a total of 13,824 observations, or once in thirty times nearly. The distribution of the rain-fall observations among the different hours is shown in the following table:—

HOURLY FREQUENCY OF RAIN-FALL.

Stations.	HOURS.											
	Mid- night.	1 A.M.	2 A.M.	3 A.M.	4 A.M.	5 A.M.	6 A.M.	7 A.M.	8 A.M.	9 A.M.	10 A.M.	11 A.M.
Roorkee -	7	12	12	12	15	11	12	11	9	9	9	7
Agra -	2	3	3	4	6	5	6	4	5	1	3	4
Lucknow -	3	5	4	4	3	2	3	6	5	4	4	3
Allahabad -	6	8	5	6	5	6	4	5	1	3	5	4
Total -	18	28	24	26	29	24	25	26	20	17	21	18

Stations.	HOURS.											
	Noon.	1 P.M.	2 P.M.	3 P.M.	4 P.M.	5 P.M.	6 P.M.	7 P.M.	8 P.M.	9 P.M.	10 P.M.	11 P.M.
Roorkee -	9	5	3	4	5	6	3	5	4	2	2	5
Agra -	5	8	5	7	6	3	2	2	4	2	2	3
Lucknow -	3	3	2	4	5	4	1	1	3	4	2	1
Allahabad -	7	3	5	3	4	2	4	3	5	2	2	4
Total -	24	19	15	18	20	15	10	11	16	10	8	13

The hour at which rain is most frequent appears to be 4 a.m. This is very nearly the time of greatest humidity of the air near the ground. The hour of least frequent rain-fall, however, occurs at 10 p.m., long after the driest time of the day, the latter falling in the afternoon shortly after the time of highest temperature. The hour of least frequent rain-fall

nearly coincides, however, with that of least humidity at the height of the cloud stratum. In the next table the distribution of cloud from hour to hour is given, and it will be seen that there is a general similarity between the cloud and rain-fall tables, though the rain-fall is more frequent in the early morning hours than the distribution of cloud would lead us to infer.

HOURLY DISTRIBUTION OF CLOUD in TENTHS of the VISIBLE EXPANSE of SKY.

Stations.*	HOURS.											
	Mid-night.	1 A.M.	2 A.M.	3 A.M.	4 A.M.	5 A.M.	6 A.M.	7 A.M.	8 A.M.	9 A.M.	10 A.M.	11 A.M.
Roorkee -	3·14	3·20	3·22	3·08	3·09	3·03	3·20	3·30	3·25	3·30	3·44	3·48
Lucknow -	2·47	2·63	2·68	2·69	2·80	3·26	3·32	3·46	3·50	3·38	3·50	3·58
Allahabad -	2·56	2·54	2·59	2·55	2·60	2·93	3·35	3·46	3·29	3·86	3·20	3·32
Mean -	2·72	2·79	2·83	2·77	2·83	3·07	3·29	3·41	3·35	3·35	3·38	3·46

Stations.	HOURS.											
	Noon.	1 P.M.	2 P.M.	3 P.M.	4 P.M.	5 P.M.	6 P.M.	7 P.M.	8 P.M.	9 P.M.	10 P.M.	11 P.M.
Roorkee -	3·65	3·49	3·77	3·74	3·61	3·41	3·33	3·18	3·05	3·07	3·19	3·12
Lucknow -	3·73	4·09	4·13	3·99	3·94	3·88	3·70	2·94	2·52	2·52	2·45	2·31
Allahabad -	3·45	3·52	3·67	3·79	3·74	3·72	3·69	2·99	2·62	2·47	2·66	2·63
Mean -	3·61	3·70	3·86	3·84	3·76	3·67	3·57	3·04	2·73	2·69	2·77	2·69

* Agra is not included in this table because the observer there only estimated the amount of cloud visible in the daytime.

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At only two of the stations, Agra and Lucknow, was the rain-fall measured from hour to hour. The number of observations was much too small to yield a mean for each hour free from considerable irregularities, but by lumping together the observations of several hours the results are rendered more uniform. Thus 32 per cent. of the total rain was collected between midnight and 6 a.m.; 35 per cent. between 6 a.m. and noon; 28 per cent. between noon and 6 p.m.; and only 5 per cent. between 6 p.m. and midnight.

The practical conclusion to be drawn from these results is that where a rain-gauge is read only once a day, the hour that will be most convenient to the observer, and at the same time will give the day's rain-fall with the least error, is 6 p.m. This has for some years been the hour prescribed for reading the rain-gauge at the meteorological observatories, and I believe it has been generally adopted for the district gauges since the beginning of the present year (1879). Previously there was no general rule as to the hour at which the rain was to be measured, those in use ranging from 6 a.m. to 7 p.m.

Annual Variation.—A reference to the figures for the mean rain-fall of each month will show that the month of least rain nearly everywhere is November. At the majority of the stations this month has been without rain ever since 1864 or (in Oudh) 1868. December is also a month of very scanty rain, but towards the end of the year the showers, usually known as the "Christmas rains," begin to fall. The winter rains continue to fall at intervals throughout January, February, and March, attaining their maximum in January at most of the stations in these provinces, in February at a few of the north-western stations on the plains and in Kumaun, and in March along the north-western frontier and in the Himalaya north of the Punjab. A second minimum of rain-fall is reached in April, this month being nearly as rainless as November at most places on the plains. The rain-fall of the latter half of March and the whole of

April and May falls chiefly in thunderstorms, or at the end of the duststorms that are frequent in these months. In March and April the precipitation accompanying thunderstorms often takes the form of hail.

The first half of June is usually a dry period, broken only by occasional thunderstorms, but between the middle and the end of the month the heavy rains of the summer monsoon commence. These are heaviest in July, usually about the end of the month. They gradually decrease in frequency and amount during August and September, and finally cease near the end of that month, or in the first week of October.

At the time of heaviest rain in July it frequently rains more or less every day for ten days or a fortnight, but in August and September the "breaks in the rains" become more numerous and last longer until the end of the rainy season is reached.

The two minima in November and April serve to divide the rain-fall of the year into two distinct seasonal falls. The winter rains extend from November to April inclusive, and have their maximum in January or February. The summer rain falls during the remaining months and attains its maximum in July. For the purposes of agriculture, it is necessary, however, to distinguish between the winter rains proper, which fall in the four months November, December, January, and February, and the showers that fall during the thunderstorms of March and April. The former are usually beneficial to the crops, whilst the latter are injurious. In drawing the maps representing the distribution of the rain-fall of the different seasons, the "winter rain" has been taken to include only that which falls from November to February; the rain of March and April, together with that of May, has been called "hot-weather rain," and that of the five months, June to October, has been called the "monsoon rain."

The relative humidity of the air near the ground has also two maxima and two minima each year, corresponding to the maxima and minima of rain.

MEAN MONTHLY HUMIDITIES IN PER-CENTAGES OF SATURATION.

Stations.	Years' Observations.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
Chakrata	8—9	64	63	55	45	50	67	91	92	84	61	50	58
Ranikhet	7	56	54	47	38	48	61	82	83	76	55	50	51
Dehra	10	58	56	48	38	38	56	79	81	75	56	50	56
Roorkee	10	66	63	51	36	36	51	76	76	73	61	57	65
Meerut	9	56	49	44	33	39	47	70	71	66	52	48	56
Bareilly	9—10	61	55	46	36	37	53	75	75	72	58	51	58
Agra	9—10	55	47	40	28	29	47	68	72	69	48	42	52
Lucknow	10	58	49	37	30	36	54	74	76	73	56	46	54
Gorakhpur	9—10	59	52	46	41	51	67	78	81	77	61	51	59
Jhānsi	10	47	39	33	24	27	46	70	70	67	43	35	43
Allahabad	6—9	60	51	40	35	37	51	75	76	76	60	53	59
Benares	8—9	65	57	45	39	41	60	81	82	80	67	63	66

This distribution of atmospheric humidity is clearly the effect rather than the cause of the rain distribution, because it is least in April before the rainy season proper, and there is only a secondary minimum in November, whereas the rain-fall is everywhere less in November than in April. The excess of humidity in November as compared with April is doubtless caused partly by the greater evaporation from the ground in the former month, and partly by the

very high temperature of April, which renders the air capable of retaining in the gaseous form a much larger proportion of moisture than it actually possesses.

The distribution of cloud observed at the meteorological stations of the North-Western Provinces accords perfectly with that of rain-fall, as might, indeed, have been expected.

RAINFALL.

MEAN MONTHLY DISTRIBUTION OF CLOUD IN TENTHS OF THE WHOLE EXPANSE.

Stations.	Years' Observations.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
Chakrata	6—7	4.51	4.18	4.03	2.92	3.48	4.20	8.42	8.47	6.79	2.28	1.74	3.62
Ranikhet	6—7	3.93	4.24	3.89	3.07	3.40	5.61	8.56	8.43	5.64	1.69	1.31	2.99
Dehra	6—7	4.08	3.55	3.58	2.77	3.06	4.36	7.62	7.29	4.83	1.08	1.33	2.74
Roorkee	6—7	3.16	3.17	2.54	2.10	1.91	3.03	6.36	6.03	4.58	0.99	0.82	2.18
Meerut	5—7	2.93	2.20	2.54	1.91	2.03	3.14	7.03	6.15	4.98	0.87	0.65	1.82
Bareilly	6—7	3.17	2.62	2.54	1.48	1.76	3.78	6.88	6.93	4.50	0.73	0.72	1.85
Agra	6—7	1.73	2.05	1.54	1.19	1.09	3.32	5.68	5.68	3.86	0.62	0.55	1.23
Lucknow	6—7	3.46	3.27	3.12	2.39	2.11	4.86	7.67	7.06	5.62	1.61	0.92	2.37
Gorakhpur	5—7	2.18	1.93	1.47	1.17	1.75	4.10	5.74	5.75	4.74	1.61	0.64	1.12
Jhānsi	3—7	0.83	0.68	0.21	0.66	0.79	1.88	5.00	4.43	2.40	0.19	0.34	0.40
Allahabad	7	2.18	2.17	1.77	1.24	1.68	4.18	8.03	7.38	5.46	1.19	0.67	2.09
Benares	6—7	2.54	2.11	2.28	2.00	2.23	4.77	7.57	7.55	5.48	2.17	0.94	1.94

The figures for the different stations in this table are not fairly comparable, since in cloud estimations a good deal seems to depend on the idiosyncrasy of the observer. Thus the figures for Gorakhpur are much too low in comparison with the others, and those for Allahabad perhaps a little too high.

The map showing the distribution of the winter rain over the provinces indicates the excess of rain at this season towards the north-west. Thus the lines of 4, 3, and 2 inches winter rain-fall, which cross the plains of the Punjab at a considerable distance from the hills, approach nearer and nearer to the Himalaya as they pass eastwards through the Doab, Rohilkhand, and Oudh, until in the north of Behar they all enter or touch the mountain zone. The districts with least rain in winter are Agra, Jalaun, and Jhānsi, with the adjoining portions of the Gwalior territory. In this respect the south-western part of these provinces resembles Malwa and the greater part of the Bombay Presidency.

The rain of March, April, and May is greater at all the Himalayan stations than that of the winter months November, December, January, and February, whereas on the plains it is a good deal less. On the plains the rain of these three months, which falls chiefly in May, varies from over three inches in north Behar to less than an inch in Bundelkhand. The region of least rain-fall in these months includes the whole of Bundelkhand, the Allahabad division, and two or three of the southern districts of Oudh. The May showers, which in Behar may be considered a regularly recurring periodical phenomenon, are only felt as such in the north-eastern districts of these provinces and in parts of Mirzapur. Elsewhere the rain-fall of May is confined to local showers accompanying thunderstorms.

The monsoon rains, which constitute nine-tenths of the average annual fall, are very similar in distribution to the total rain-fall of the year.

Regularity of the Seasons in India.—Nothing can better illustrate the great regularity of all the elements of meteorological observations in India than the small variability of the dates of the beginning and end of the rainy season. Thus, at Bombay, in three years out of four, the monsoon rains commence on the 4th or 5th of June, and when they are a week later than usual, as they were in 1878, all sorts of dire effects are expected to follow. The farther any place is from the coast the less likely are the moist winds to reach it every year about the same time, but even in the North-Western Provinces the uniform sequence of the seasons is very striking.

Thus the winter rains commence on the average about the 22nd of December in the north-western districts, and a day or two later in the south-eastern; hence their usual name "the Christmas rains." The greatest observed variations from this date during 16 years were 20 days before and 17 days after the mean. The odds are exactly even that in any given year these rains will commence between the 20th December and the end of the month.

The dates of the beginning and end of the summer monsoon are given in the next table. In Kumaun and Gorakhpur the rains begin earliest, and in three days they extend over the whole province. But although there is a great deal of uniformity in the average dates, nothing like a regular march of the monsoon from one end of the province to the other, can be observed in any single year. The summer rains cease first in the Punjab and the north-western districts of these provinces, and continue longest in the most easterly district, Ghāzipur.

DATES OF THE COMMENCEMENT AND CLOSE OF THE MONSOON RAINS, FROM THE OBSERVATIONS OF 15 YEARS.

Districts.	COMMENCEMENT.			CLOSE.		
	Mean.	Earliest.	Latest.	Mean.	Earliest.	Latest.
Gorakhpur	14th June	30th May	1st July	1st October	20th September	19th October.
Ghāzipur	16th "	1st June	2nd "	3rd "	20th "	19th "
Benares	17th "	6th "	3rd "	30th September	15th "	18th "
Allahabad	16th "	4th "	1st "	30th "	15th "	16th "
Cawnpore	17th "	4th "	3rd "	28th "	17th "	17th "
Bareilly	16th "	1st "	9th "	29th "	17th "	18th "
Jhānsi	16th "	4th "	28th June	28th "	16th "	16th "
Agra	17th "	3rd "	10th July	26th "	11th "	17th "
Sahāranpur	17th "	3rd "	8th "	27th "	11th "	18th "
Kumaun	14th "	1st "	29th Jun	1st October	18th "	17th "
Dehra Dūn	16th "	2nd "	1st Ji	30th September	13th "	18th "

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The extreme variation of the date of commencement on the average of the 11 districts given in the table is exactly a month, and the variation of the date of the cessation of the rain is just the same. The table shows that the usual rule regarding the duration of the monsoon rains, viz., that they commence in the middle of June, and last to the end of September, is very close to the truth.

Causes of the observed Distribution in Time.—At the end of October and throughout November the atmosphere over Northern India is more nearly in a state of statical equilibrium than at any other time of the year. Very light winds or calms prevail over the whole area in November. The fluctuations of pressure are confined to the daily barometric tides, and a succession of slow pulsations of very small amplitude with a period of ten days or a fortnight. Similar conditions obtain in December, but in that month the wind velocity becomes greater, and the amplitude of the barometric oscillations also increases. Towards the end of the month "the barometer falls" for several days, easterly winds set in over the Gangetic valley, thus reversing the normal direction of the lower atmospheric current; clouds form, and rain begins to fall, generally commencing in the Punjab, and extending eastward over the North-Western Provinces, and occasionally over Behar, Bengal, and even Assam. The explanation appears simple. It has been pointed out that the important air movements at this time are not horizontal, but vertical. The fall of the barometer preceding the setting in of the easterly winds and the rain-fall appears to indicate an ascensional movement of the atmosphere going on over a part or the whole of Northern India. The ascensional movement is, in the majority of cases, the indispensable condition for the formation of cloud and for rain precipitation. This is followed by indraught, which takes mainly the form of an easterly current up the Gangetic valley. Hence, according to this view, the easterly winds are a frequent accompaniment, and therefore an occasional indication, but they are not the cause of the cold weather rains, neither do they bring them. These rains are almost entirely due to the moisture brought up by the upper south-west current, the reverse of the north-east trade wind, which is the characteristic wind of the lower strata of the cold season in Southern Asia and the adjacent seas.*

It was formerly supposed that the winter rains were simply the effect of the low temperature of the winter months, whereby a portion of the aqueous vapour always present in the air was condensed. This view is, however, inconsistent with the fact that in the North-West Punjab, where these rains are heaviest, the month in which the precipitation is greatest is March, whereas the coldest month is January. In a year when these rains are heavy in January, as in 1877, there is also a well-marked increase in the pressure of atmospheric vapour in January as compared with the months before and after, although the low temperature of the month would by itself tend to diminish the pressure of vapour. This may be illustrated by the following table, which gives the vapour tension for three winter months of 1876-77 at 20 places in North India. The increase in January 1877 was very well seen as far down as Lower Bengal, but on the eastern side of the Bay it was not perceptible.

* This account of the origin of the winter rains, the most rational I have yet seen, I have taken the liberty of reproducing from Mr. Eliot's report on the meteorology of India for 1877. It seems probable, however, that the easterly winds in the valley of the Ganges which accompany these rains may not be altogether the effect of the rains, but partly also their cause, and may be connected with a considerable change in the direction of the upper current, indicated by the wind-directions at Chakrata during the winter months, viz., in November, S.W. by S.; in December, S.S.W.; in January, S.E. by S.; in February, S.E. by E.; in March, S.S.E.; and in April, S.W. by W.

INCREASE OF VAPOUR TENSION IN NORTH INDIA
in January 1877.

Stations.	VAPOUR TENSION.		
	December 1876.	January 1877.	February 1877.
Simla - - -	Inch. 160	Inch. 173	Inch. 171
Chakrata - - -	154	164	147
Dehra - - -	305	317	301
Ranikhet - - -	195	201	182
Peshawar - - -	256	260	227
Rawal Pindi - - -	256	277	255
Sialkot - - -	326	362	330
Lahore - - -	258	315	295
Delhi - - -	233	320	277
Roorkee - - -	311	339	330
Meerut - - -	270	338	300
Bareilly - - -	285	351	334
Agra - - -	265	329	263
Lucknow - - -	280	368	295
Gorakhpur - - -	329	383	336
Jhansi - - -	245	309	257
Allahabad - - -	343	427	349
Benares - - -	309	388	321
Hazariabagh - - -	256	344	270
Chittagong - - -	457	459	482

The excess in January 1877 was no doubt partly perhaps chiefly, an effect of the evaporation of the heavy rain of that month; but it was not altogether due to this, because the original observations, from which the means in the table have been calculated, show a distinct increase in the proportion of vapour accompanying the easterly wind which set in two days before the rain commenced in the North-Western Provinces.

Since these rains, accompanied or preceded by moist south-easterly wind, begin first in the Punjab, whilst in the eastern districts of the North-Western Provinces and in Behar dry winds from the opposite quarter are blowing, it would be difficult to account for their formation were it not known that an upper current from the south or south-west nearly always blows in opposition to the trade wind of the north hemisphere, and that in subtropical regions this descends and becomes a surface wind. As a current of air is cooled on ascending, it is heated by descending and being compressed. Consequently the moist current from the equator does not usually precipitate its vapour in the region of its descent unless there is some independent cause of cold at work. Accordingly we find that in the subtropical zones of both hemispheres, outside the region of the monsoons, as, for example, in Afghanistan, Persia, Asia Minor, the Mediterranean coast region, California, the Cape of Good Hope, and South Australia, rain is almost entirely confined to the winter months. There can be little doubt that the winter rain of North India is only a part of the same general phenomenon.

If this be the case, the easterly or south-easterly winds of the Gangetic valley, that precede or accompany the winter rains, would be explained, as, in part at least, due to the descent of a branch of the equatorial current in a region lying to the south of the Ganges; its subsequent northward movement being modified by the direction of the mountain range. The upward deflection of this current where it strikes against the mountains of the north-west Punjab would suffice to start the precipitation; and, as has been already shown, the rain-fall when once commenced will tend to perpetuate itself. The influence of the equatorial current thus continues to be felt in the extreme north-west, where the rains are heaviest down to the end of March or April. Over India proper the north-west winds of the hot season are by that time blowing in full strength; and the upper current only shows itself now and then in the form of streaks of cloud drifting from the south-west, or in

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the rain or hail that falls during a thunderstorm. In the hot season the region of the descent of the upper current has probably travelled far to the north or north-west of the Indian area.

As the temperature rises in March and April hot north-westerly winds blow down the valley of the Ganges with increasing velocity. These are, however, only day winds, blowing most strongly in the early hours of the afternoon, and dying away about sunset. During the months characterised by these hot winds the barometer falls steadily over India, and the decrease of pressure is greatest in the Punjab and Rajputana whence the winds blow. At last the usual relation between pressure and wind direction becomes reversed, and the winds for some time blow apparently from places where the pressure is low to places where it is higher.

In the cold weather months the barometer stands highest in the Punjab, and the pressure decreases uniformly southwards to the neighbourhood of the equator. During the hot weather the pressure falls more rapidly in the interior of Northern India than over the Bay of Bengal and the Arabian Sea; thus in April there is a ridge of high pressure stretching across the Southern India and the Bay, from which the north-east monsoon continues to blow on one side, and southerly sea winds, which bring frequent showers to the coasts of Bengal and Orissa, on the other.

As the season advances these sea winds increase in strength, and the ridge of high pressure moves southward, but the winds are still confined to the lower strata of the atmosphere only. At last, about the middle of May, the high pressure of the centre of the bay retreats to the equator and disappears; there is then a nearly uniform slope of pressure or "baric gradient" extending from the tropic of Capricorn to the Himalaya. This sets in motion towards Southern Asia a broad and very deep current of the atmosphere, which, blowing over an immense area of warm sea, arrives saturated with moisture.* Along the west coast of India it appears as a westerly or south-westerly wind (owing to the deflection caused by the earth's rotation), at the head of the Bay of Bengal its direction is nearly due south, and in the valley of the Ganges it is south-easterly or easterly, while in the north of the Punjab it is often north-easterly. The movement of the wind of the summer monsoon is therefore cyclonic or rotatory round the region of greatest heat at the end of June or beginning of July; but the westerly winds which blow across Southern India, in what may be called the normal course of the monsoon, are much more powerful than those which blow up the valley of the Ganges from the east. These easterly winds, though all important to the North-Western Provinces, Behar, and the eastern half of the Punjab, are in fact only a minor eddy in the great south-westerly current that sets in towards Southern Asia in the summer months; and being only a minor feature of the general movement, they are very liable to be disturbed by small and apparently quite insignificant variations in the distribution of barometric pressure.

The monsoon rains commence in the extreme south of India, Ceylon, and Burmah in the last week of May. They advance rapidly along the coast, and reach Bombay in the first and Calcutta in the second week of June. Though the advance is pretty uniform along the coast, it is by no means so in the interior of Upper India. The temperature of this region being much higher than that of the Bay of Bengal, the sea wind advancing inland will for that very reason become drier, and may continue to blow for days or even weeks before an atmospheric disturbance sufficient to cause general rain-fall is set up. In this way the approach of the rains is heralded by a sudden and great increase of the proportion of aqueous vapour in the air, sometimes a week or more before the rain begins, and even before the direction of the wind at

* This account of the transition from the N.E. to the S.W. monsoon is substantially the same as that given in the Meteorological Report for 1877 by Mr. Eliot.

the surface of the ground gives any indication of its approach.

At last some cause, perhaps slight and apparently accidental, sets a portion of the air in upward motion and rain commences. It has already been shown how the fall once commenced tends to perpetuate and feed itself by setting free latent heat and expanding the air, thus producing a further upward movement and the indraught of more moist air.

In this way rain continues to fall at frequent intervals over Upper India until the time of the autumnal equinox, when the rapid retreat of the sun to the south of the equator produces a general lowering of the temperature and a weakening of the monsoon current, which gradually dies away about the end of September. By the middle of October the rains have usually ceased, and the season of clear skies, uniform pressure, and feeble north-westerly winds has come round again.

Monthly Frequency of Hailstorms.—In connexion with the monthly distribution of rain-fall it may be well to state what is known of the relative frequency of hailstorms at different seasons of the year. A knowledge of the distribution of these storms both in time and in space is of such immense importance to agriculture in this country that it might be thought the occurrence of each storm would be carefully noted in the weekly rain returns furnished by the district officers. As a matter of fact this has very seldom been done, however, the column of the rain-fall forms headed "Remarks" having been for many years usually occupied by the information that the wind during the week was "easterly and westerly" and the weather "cloudy and clear." Of late the latter remark has fallen into the disuse it merited. During the years 1873-77, Dr. Bonavia of Lucknow received information of nearly every hailstorm observed in the province of Oudh, and published the same in a tabular form in the annual reports of the Lucknow Observatory. From his tables, combined with the few notices of hailstorms in the reports of the Board of Revenue, and with occasional notices of such storms during 1878 furnished by the district officers, the following figures are taken. They give nearly all the available information on the subject:—

Month.	Number of Storms.
January - - -	10
February - - -	11
March - - -	18
April - - -	9
May - - -	4
June - - -	0
July - - -	0
August - - -	0
September - - -	0
October - - -	3
November - - -	0
December - - -	0

The month of greatest frequency is March, and the four months of the rainy season June, July, August, and September, as well as the dry months, November and December, appear to be free from hail. In May and October these storms are very unusual, the only ones recorded having occurred in October 1877, and May 1855 and 1878; these months being all characterised by very extraordinary atmospheric conditions in Northern India. The figures, so far as they go, agree fairly with a table of the relative frequency of hailstorms at different seasons, published by Dr. Buist in the British Association Report for 1855. Dr. Buist's table includes observations from all the provinces of India. It shows that hail is most frequent in February, March, and April, and very rare in the remaining months, especially during the rainy season.

The hailstones which fall in May in these provinces seem to be distinguishable by their immense size. On the 11th of May 1855 a hailstorm occurred at Naini Tal in which many stones of 6, 8, or 10 ounces in weight, and even one or two weighing more than a

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pound and a half, were observed to fall, the circumferences of these varying from 9 to 13 inches.

In May 1878, there were severe hailstorms in many districts on the 6th and 8th. On the former day hailstones weighing a pound and a half each fell at Muhammadabad and Rasra, in the Ghazipur district, and others from two to two and a half inches in diameter fell at Azamgarh. About the same time there was a storm at Naini Tal in which some of the hailstones were sufficiently heavy to punch holes through the zinc roofs on which they fell; and the quantity of hail which fell was so great that it lay in shady places nearly a month. In the cooler months of February, March, and April such large hailstones have not been observed.

All the districts of the North-Western Provinces and Oudh are subject to occasional visitations of hailstorms. Those parts of the provinces from which they are most frequently reported comprise the Himalayan districts, Rohilkhand, Oudh, the middle Doab, Hamirpur, and Jhānsi.

Variations of long period.—Of late years the questions whether the sun's heat is variable or not, and whether any variation that may exist can be detected in remote meteorological effects, such as rain-fall, have excited a considerable degree of interest, and given rise to long discussions in *Nature* and other scientific journals. Nothing like a definite conclusion regarding these questions has yet been arrived at; many observers holding that there is a balance of evidence in favour of an excess of solar heat and terrestrial rain-fall when sun-spots are numerous, and

others that the heat is greatest when the sun-spots are few. The question as regards its bearing on the rain-fall of North India has recently been discussed in a paper published in the third part of the *Indian Meteorological Memoirs*. In this I have shown that no distinct relation whatever between the sun-spots and the rain brought by the summer monsoon can be traced, but that there is some evidence in favour of an inverse relation between the area of the spots and the winter rain, the latter being generally heaviest a year or two before the spots reach their minimum. In this respect the winter rain-fall of North India and other subtropical countries resembles the temperature of stations lying between the tropics, these places being generally hottest about a year before the sun-spot minimum. The simplest explanation of this relation is that in hot years, a larger proportion of vapour than usual is raised between the tropics and transported by the upper current to North India and the Himalaya, where it is precipitated during the winter months.

It is by no means true, as some people have suggested, that Indian famines always occur about the time of minimum sun-spot, and that a careful study of the surface of the sun would enable us to predict them. Taking all the famines and scarcities that have occurred in Upper India since the commencement of British rule, as given in Mr. Girdlestone's *Past Famines of the North-Western Provinces*, together with a list of those that have occurred since his report was written, we may classify the years in which they occurred according to the character of the sun-spots as follows:—

FAMINES recorded in the NORTH-WESTERN PROVINCES, classified according to SUN-SPOT CHARACTER.

Sun-spot Area.	Famines and Scarcities.	Total Number.
Maximum	1803-4, 1819, 1827-28, 1837-38, 1860-61	5
Medium	1813-14, 1825-26, 1868-69, 1873-74	4
Minimum	1783-84, 1832-34, 1867, 1877-78	4

The table shows that famines due to the failure of the summer rains are just as likely to occur at one part of the sun-spot cycle as at another, or that if famines be any more probable at one time than at another they are rather more likely to occur when sun-spots are numerous than when they are few. This conclusion is directly opposed to the usual theory on the subject. It may be objected that in this table great famines are classed together with the local scarcities like that of 1867 in Kumaun and that of 1873-74 in Gorakhpur and Behar. When our attention is restricted to the four great droughts of the period, however, we arrive at exactly the same results. Two of these, the first and the latest, occurred at minimum sun-spot epochs, and the other two, those of 1837-8 and 1860-1, at times of maximum sun-spot.

An attempt has been made to calculate the mean rain-fall of the North-Western Provinces for each of the past 35 years in terms of the average for many years. The results are here given in the variations of the winter and summer rains as well as of the annual fall being shown. The winter rain of any year means that which fell between November of the preceding year and April of the given year.

MEAN RAIN-FALL of the NORTH-WESTERN PROVINCES for each YEAR from 1844 to 1878, in PER-CENTAGES of the AVERAGE for many YEARS.

Year.	Number of Stations.	Winter.	Summer.	Whole Year.
1844	28	?	87	?
1845	29	143	91	96
1846	29	66	106	102
1847	28-29	76	105	103

The per-centage for each year has been arrived at in the following way. Let $r_1, r_2, r_3, \dots, r_n$ be the rain-falls of a number of stations for the given year,

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and let the averages for the same places be $R_1, R_2, R_3, \dots, R_n$ respectively. Then—

$$\text{Per-centage} = 100 \times \frac{r_1 + r_2 + r_3 + \dots + r_n}{R_1 + R_2 + R_3 + \dots + R_n}$$

For most of the years where 28 or more stations have been taken into account, the figures may be taken as fairly accurate, but for the years 1856-60 there is a large probable error. No records for any of the plains stations during those years have been discovered, and the figures in the table are founded on observations taken at a few places in Kumaun and Dehra Dun, supplemented by returns from three or four stations in the Punjab and from Jabalpur in the Central Provinces.

The first conclusion to be drawn from the table is that, so far as past experience enables us to judge, it is not likely that more than six dry years or six wet ones will ever occur in succession. The longest dry period in the table included the six years from 1848 to 1853, and the longest wet period extended from 1870 to 1875.

There is also a considerable balance of evidence in favour of a rule that when the winter rains have been unusually heavy the succeeding rains of the summer monsoon will be light, and *vice versa*. The following 12 years had the winter rain-fall excessive, and that of summer defective, viz., 1845, 1850, 1851, 1852, 1853, 1859, 1865, 1866, 1868, 1869, 1877, 1878; and 13 years, 1846, 1847, 1854, 1856, 1858, 1861, 1862, 1863, 1867, 1871, 1873, 1874, 1875, had dry winters followed by wet summers. Against these 25 instances in favour of the rule there were only three years, 1855, 1870, and 1872, with the rain-fall excessive in both seasons; and six, 1848, 1849, 1857, 1860, 1864, and 1876, with a deficiency both in summer and winter. In his report on the meteorology of India for 1876, Mr. Blandford has suggested a reason for the inverse variation of the rain-fall of the winter and summer seasons. It is that an unusually great precipitation of snow on the north-west Himalaya, accompanying heavy winter rains, will retard the rise of temperature over Northern India in April, May, and June, and thus prevent to some extent the diminution of pressure that causes the indraught of the vapour-laden winds from the south. On the other hand, when the snow-fall has been less than the average, the temperature will rise, and the pressure decrease more than usual, and the southerly winds of the summer monsoon will be unusually strong. The explanation is, however, incomplete, for the year 1871, in which the winter rains were light and those of the summer were far heavier than usual all over North India, was characterised by a very low temperature in April, May, and June; whereas 1878, a year of heavy winter and scanty summer rains, had the hottest June ever recorded. Although this relation between the rains of the cold and hot seasons has not yet been satisfactorily explained, it may for the present be adopted as a fairly good empirical rule, the exceptions to which are not likely to be very numerous.

The winter rain-fall of the province is seen to be much more variable in amount than that of the summer season, the former ranging from 22 to 217 per cent. of the average, while the latter only ranges

between 45 and 135 per cent. Owing to the inverse relation between the rain-falls of the two seasons, already pointed out, the annual totals on the average of the whole province have a still smaller range, the maximum being only 31 per cent. above the mean, and the minimum 44 per cent below it.

Nevertheless, at individual stations, the variability of the annual totals is extremely great, as the following examples will show. The highest rain-fall at Dehra, in any year for which we have complete returns, was 112.6 inches in 1853, and the lowest was 35.1 inches in 1848. At Naini Tal the rain-fall ranged between 131 inches in 1853 and 30.1 in 1860. On the plains the variability is almost as great. Thus, at Meerut the rain-fall in 1870 was 40 inches, and in 1868 only 15.6; at Bareilly 58.8 inches fell in 1878, and only 23.7 in the previous year; at Agra 46.5 inches fell in 1873, and only 9.8 inches in 1877. Farther east, we have for the maximum at Allahabad 61 inches in 1854, and for the minimum 15.7 in 1864; at Benares 64.4 inches in 1848, and only 19.5 inches in 1864; and at Jaunpur a range from 74 inches in 1871 to 7.6 in 1846.

In the Jhānsi division and in Oudh, although the observations for these are for a smaller number of years, the variability of the annual rain-fall appears to be quite as great as in the districts for which the records go back to 1844. Thus, at Jhānsi the rain-fall of 1868 was only 13.3 inches, while that of the next year amounted to 52.3 inches; at Lucknow 64.9 inches fell in 1871, and only 14.4 in 1877, and at Fyzabad the figures for the last 10 years range between 87.2 inches in 1871 and 17.4 in 1876.

In years when the average rain-fall of the whole province is below the mean, some districts are subject to unusually heavy local falls. In 1877, for example, when the average summer rain-fall for the whole province was less than half the usual amount, there was a succession of heavy downpours in Jaunpur, which brought the rain-fall of the summer months at that station nearly up to the average. In like manner, a succession of very heavy falls of rain in July and August 1878 rendered the totals for these months at Bareilly, Dehra, and Mussoorie very excessive, while the rain-fall of the same months was deficient in amount over nearly all the rest of the province.

It has been pointed out by Mr. Blandford that these irregularities of rain-fall distribution (which are also observed in rainy years, though they are then not so striking) appear to be determined by certain minute but persistent differences of atmospheric pressure which modify the directions of the prevailing winds, and thus send unusually large quantities of vapour to be precipitated over well-defined local areas. Many of these pressure differences are already established at the commencement of the rainy season, and others originate during its continuance, but once set up they usually persist for several months or even years. Thus an accurate knowledge of their amount and distribution, combined with a knowledge of the probable general character of the coming monsoon, derived from observations taken over the whole of India and the Indian seas, may one day afford a basis for foretelling the distribution of the rain-fall before the commencement of the summer monsoon.

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After giving an account of the normal distribution of wind and rain-fall and their causes in the Province of Bengal, a description mainly drawn from Mr. Blandford's reports, and which therefore need not be repeated here, he goes on thus:—

We must now take up each division in turn and describe the normal rain-fall and prevalent winds, and how they differ one from another. It is believed that considerable reliance may be placed upon the accuracy of the statements of rain-fall, &c. which are

afterwards given; for each sadar and subdivisional station is furnished with a Symon's rain-gauge, which is of the simplest construction, and is therefore very little liable to get out of order, and which is again so simple in principle that it is difficult to imagine that any mistake can be made in its readings. The rain-fall recorded by these instruments is daily registered, and the reports are in most cases forwarded to this office through the civil officer in charge of each division. The other statistics here given, such as

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wind directions, &c., are obtained from the records kept by the meteorological observers at the various stations under this department, and which are also believed to be very fairly accurate. It will be convenient to commence with the divisions from the eastward, working towards the west; and it will be seen below that in this way we shall follow as nearly as possible what may be called the natural sequence, commencing with the district having the greatest rain-fall, working down to that with the smallest. Thus we have the following divisions with their rain-fall, working from east to west:—Assam,* 115 inches annual rain-fall; Chittagong, 100 inches; Dacca, 76 inches; Cooch Behar, 134 inches; Rajshahye, 72 inches; Presidency, 58 inches; Burdwan, 57 inches; Bhagulpore, 52 inches; Orissa, 60 inches; Chota Nagpore, 49 inches; and Patna, 45 inches. There are only two exceptions to this sequence, that is, Cooch Behar and Orissa, and these two are exceptional—the first, because it includes the Himalayan stations, and the second, because a large proportion is on the sea-coast.

Chittagong.—This division is, next to Assam, the most easterly, and, as before stated, it receives also a large proportion of rain-fall. This division is represented by the following rain-fall stations:—Chittagong, Cox's Bazar, Noakholly, Comillah, Brahmanberiah,

* The report on the rain-fall of Assam is described in a report submitted to that Government.

RAIN-FALL in the CHITTAGONG DIVISION in INCHES.

Names of Stations.	Number of Years of Records.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Year.
Averages†	4 to 19	0.71	0.83	2.04	4.96	10.37	22.17	21.11	18.25	11.99	6.89	0.87	0.21	100.40
Chittagong	17 to 19	0.59	1.31	1.31	4.71	9.17	22.53	22.17	21.46	12.94	6.31	1.71	0.39	104.60
Noakhally	17 to 19	0.47	0.80	2.09	3.86	9.91	22.67	20.99	20.26	15.92	8.37	1.42	0.11	106.87
Tipperah	14 to 16	0.79	0.83	2.49	7.05	11.42	19.06	16.76	15.28	9.77	6.14	1.35	0.08	91.02
Rangamattee Hill	8	0.43	0.83	2.33	4.46	10.30	17.52	18.17	18.38	11.19	7.85	1.23	0.22	92.91
Hill Tipperah	4 to 5	1.35	0.98	3.29	5.24	10.13	14.43	10.88	16.37	8.03	4.22	1.17	0.20	76.29

† Average of whole division.

The division of Chittagong is thus well supplied with rain, as, on the average, 100.40 inches are recorded; this is fairly distributed in the whole division, and is usually spread over from six and seven months, the three months June, July, and August being as a rule the wettest.

Dacca.—In this division we have chiefly low-lying lands which receive the monsoon currents direct from the Bay of Bengal, and therefore the average rain-fall is fairly high. The number of recording rain-fall stations has varied from 11 to 14, and the number of years over which observations have been taken has been in the larger stations 16, but in the subdivisional stations only four years. The principal stations may be considered to be Dacca, Furreedpore, Burrisal, and Mymensingh, and these may be accepted as typical of the whole district.

RAIN-FALL in the DACCA DIVISION in INCHES.

Names of Stations.	Number of Years of Observations.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Year.
Divisional Average	4 to 16	0.71	1.12	1.79	4.23	8.50	16.48	15.27	12.74	10.57	4.86	0.20	0.13	76.60
Dacca	23 to 25	0.29	0.83	2.33	6.44	9.51	12.82	11.64	12.10	9.52	5.51	0.75	0.18	71.92
Furreedpore	8	0.54	0.96	2.32	4.83	9.34	13.49	11.33	12.46	11.02	3.95	0.26	0.01	70.51
Burrisal	8 to 9	0.78	1.14	1.70	2.79	6.75	15.17	16.78	12.83	10.40	4.49	0.89	0.17	73.89
Mymensingh	10 to 12	0.35	1.09	1.44	7.09	13.89	22.07	16.39	14.78	12.99	4.85	0.13	0.05	95.12

Rangamattee Hill, and Hill Tipperah; and rain-fall observations have been made in these stations for periods varying from 4 to 20 years. Most of these stations are at or near the sea level, many lie almost on the sea-coast, whilst to windward of them there is a range of mountains that runs obliquely across the path of the south-west monsoon, and which materially alters its direction. Speaking generally, we may say that the northern stations of this division receive a larger share of rain-fall than the southern. The winds in the Chittagong district are strongly northerly during the months from November to February inclusive, but in March and April the southerly element predominates, and the south-west monsoon commences here in April and continues to blow steadily for seven months; owing partly perhaps to the obstacle presented by the Arracan Mountains to the progress of the south-west monsoon, or perhaps to a greater extent to the low barometric pressure in the Gangetic delta, the wind directions in this division are south-east and south-south-east during the greater part of the monsoon months, and apparently the wind is more easterly in the northern parts than in the southern. The rains begin earlier at the northern than at the more southerly stations, for at the latter little rain falls in April, and that in May is usually light.

The average monthly rain-fall for the whole of this division, together with the average rain-fall of some of the principal stations, are here given—

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This table clearly shows that in its progress westwards the average rain-fall is steadily diminishing, although this is perhaps not quite so marked as in some cases that will be quoted from subsequent divisions.

Cooch Behar.—In this division we have a marked example of the influence of hills and mountain ranges in increasing the rain-fall of a district. The average annual rain-fall of this division is 134.57 inches, the highest in fact of any division here treated of. There are here five rain-fall recording stations, namely, Darjeeling, Julpigoree, Cooch Behar, Buxa, and Boda. All these stations are situated either in the hills or at the foot of them, and it will be seen that in each case we have heavy rain-fall. The wind directions are only recorded at one station, namely, Darjeeling, and here for the first five months in the year there

is a great preponderance of westerly winds, which, however, in June change round to the south and remain at or about this quarter until October, when the wind direction again turns towards the west. Slight rains commence in this division in April and May, but the monsoon months are really June, July, August, and September; comparatively small quantities falling in October. In this division the rain-fall is not uniform, nor could it be expected to be so, for some of the stations are on the plains and others in the hills. Thus at Buxa there is an annual fall of 238.90 inches, whilst at Boda only 88.07 inches fall: Buxa is on the hills, Boda is on the plains. The following table shows the average monthly rain-fall for the whole division, as also for the five stations above mentioned:—

RAIN-FALL in the COOCH BEHAR DIVISION in INCHES.

Names of Stations.	Number of Years of Observations.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Year.
Divisional Average	4 to 7	0.73	0.41	1.34	5.53	10.46	30.14	29.60	26.59	22.81	6.73	0.11	0.12	134.57
Darjeeling	14 to 17	0.35	1.00	1.25	3.78	6.10	24.80	27.22	24.60	15.81	7.24	0.17	0.15	112.47
Julpigoree	7 to 8	0.47	0.28	1.75	4.45	9.12	30.46	25.42	23.67	23.76	6.23	0.02	0.03	125.66
Cooch Behar	5 to 6	0.56	0.13	0.62	6.95	12.09	35.72	21.85	21.76	16.14	5.38	0.05	—	121.25
Buxa	8	0.90	0.85	1.68	9.15	18.82	46.59	54.41	43.99	33.68	11.33	0.55	0.50	222.43
Boda	6 to 7	0.60	0.27	0.63	2.59	7.36	21.04	14.91	17.38	16.26	6.85	—	0.08	87.97

Here we have a division far removed from the sea, yet standing at the head in the list of rain-fall. This is caused by the fact previously stated, that when air laden with moisture rises it expands and is thereby cooled, and by the fall of the temperature a large proportion of the vapour is deposited in the form of rain, and though in this instance the monsoon current has deposited part of its moisture by passing over a large portion of land surface, yet when it rises and becomes cooled, a further and generally larger quantity of rain is again produced.

Rajshahye.—This division is situated at some little distance to the south and east of the hills, and yet their influence is not altogether unfelt; for it appears that the rainfall in many of the Rajshahye stations is higher than others in the same latitude in the Gangetic delta. This is probably owing to the influence of the hills on the north and north-east which obstruct

and deflect the monsoon current, and thus increase the precipitation of its vapour; consequently there is a larger fall of rain in the division than would otherwise be the case. There are here 10 rain-fall recording stations which have been established for periods varying from 5 to 20 years. There is now only one wind direction record kept in this district; but up to 1874 Berhampore was included in this division (it is now, however, in the Presidency division), and the records from this station show that from May to September south-east winds probably prevail in Rajshahye. The rains are heaviest here from June to September, but a fair quantity also falls in May and October.

The rains are here somewhat unequally distributed, as is shown by the following table, giving the average monthly rain-fall for the whole division, and the average for several of the larger stations:—

RAIN-FALL in the RAJSHAHYE DIVISION in INCHES.

Names of Stations.	Number of Years of Records.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Year.
Divisional Average	5 to 20	0.52	0.92	1.09	3.34	6.68	15.21	14.67	12.48	12.37	5.09	0.30	0.11	72.78
Dinapore	13 to 16	0.20	0.66	0.60	2.80	7.25	19.16	15.43	13.19	12.67	6.68	0.02	0.04	78.70
Maldah	18 to 20	0.46	0.85	0.86	1.86	3.21	9.85	10.16	9.56	10.71	4.50	0.18	0.40	52.60
Bauleah	14 to 17	0.30	1.19	1.18	1.95	5.76	11.01	12.29	10.27	10.85	5.24	0.25	0.04	60.33
Rungpur	14 to 16	0.39	0.33	0.95	3.11	9.81	21.86	16.65	13.40	11.64	5.43	0.04	0.12	83.73
Bogra	12 to 15	0.58	1.03	0.75	4.63	9.09	16.58	16.55	11.21	13.58	5.46	0.29	0.10	79.85
Pubna	9 to 10	0.44	0.71	1.26	4.54	7.38	12.29	10.61	11.35	10.83	4.47	0.10	0.02	64.00

Speaking generally, we may say that, other things being equal, the easterly and northerly stations in this division receive more rain than the westerly and southerly ones, and also that the rains usually begin somewhat earlier in the former than in the latter stations.

Presidency Division.—We have here a division in which the average rain-fall is fairly equally distributed; there are some 26 recording stations, and in some instances records for as long as 47 years are available; but in the case of the subdivisional stations only four years' observations have been recorded.

Here, as before, the wind direction passes from the north or north-west in January through west to south in April, but it is not till June that the wind becomes full south or somewhat east of south; and it is by the wind current from this latter quarter that the larger proportion of rain is brought. In October the wind veers round again to the north and the rains cease. The rain-fall usually commences in the south part of this division in the second or third week in June, and ceases about 15th October; in the northern parts of this district the rains commence somewhat later and end rather earlier. The principal rain-fall in this

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district occurs in the three months June, July, and August; smaller quantities falling in September, October, and May. The diminishing quantity in the two former months is due to the slackening of the monsoon current, and the rain-fall in May is principally due to the class of storms called "north-westers."

Winter rains are somewhat rare in the southern part of this division.

The table below contains the average monthly rain-fall for the whole division, and also the averages of some of the principal places:—

RAIN-FALL in the PRESIDENCY DIVISION in INCHES.

Names of Stations.	Number of Years of Observations.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Year.
Divisional Average	4 to 47	0.57	1.10	1.31	2.73	5.15	11.63	10.70	10.98	8.43	4.96	0.32	0.10	57.98
Saugor Island	9 to 10	0.18	0.76	1.07	1.59	4.62	12.72	14.63	14.26	13.07	10.94	0.66	0.05	74.55
Calcutta	48	0.43	0.87	1.35	2.39	5.40	12.08	12.73	13.94	10.18	5.61	0.55	0.23	63.81
Alipore	6 to 7	0.33	1.69	2.20	2.09	4.49	11.22	13.23	13.97	9.09	6.29	0.30	0.09	64.99
Kishnaghur	12 to 14	0.59	0.89	1.04	4.06	7.18	11.38	10.13	10.20	6.85	4.24	0.07	0.15	56.78
Jessore	14 to 17	0.59	0.62	1.67	3.68	7.36	13.48	10.75	11.50	8.78	5.62	0.73	0.12	64.90
Berhampore	19 to 21	0.42	0.90	1.09	2.32	4.22	9.91	10.02	10.21	9.41	5.64	0.16	0.08	54.38

In this division we may notice generally that, other things being equal, the southerly stations receive a larger proportion of rain than the northerly, and the easterly stations a larger proportion of rain than the westerly.

Burdwan.—This district in position and general condition is similar to the Presidency division, and like it receives a moderate rain-fall; the average for the whole of the Presidency division being 57.98 inches, whilst that of the Burdwan division is 57.11 inches. There are 15 rain-fall recording stations in this division, and the period during which registration has been effected varies from 4 to 20 years. The rain-fall in this district is tolerably uniformly distributed, and it is brought by winds from the same direction as those described for the Presidency division; if anything, the direction in the Burdwan district

is rather more easterly. As before, the months in which the largest amount of rain falls are June, July, August, and September, and these are the months which are characterized by south-east and south-south-east winds; it is in fact from this quarter that the larger proportion of the monsoon rain comes. In October and May also there is a moderate rain-fall, the former being brought by the close of the monsoon, and the latter principally by the storms known as north-westers. The period of the commencement of the monsoon is about the same as that given for the Presidency district; but as before, in the southern portion of the division, the monsoon commences rather earlier than in the northern part.

In the following table we have the average monthly rain-fall for the whole division, and also the average for some of the principal stations:—

RAIN-FALL in the BURDWAN DIVISION in INCHES.

Names of Stations.	Number of Years of Records.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Year.
Divisional Average	4 to 20	0.56	1.30	1.42	2.16	4.14	10.00	11.47	11.65	8.62	5.29	0.33	0.17	75.11
Burdwan	14 to 16	0.67	1.10	1.58	2.80	4.51	11.07	12.44	11.78	8.51	5.40	0.24	0.52	60.62
Bankoora	17 to 19	0.33	1.13	1.66	1.72	3.44	10.08	12.62	10.58	8.63	5.29	0.38	1.00	56.86
Sooree	13 to 14	0.48	0.93	0.72	0.86	2.34	9.62	12.95	12.62	9.39	4.18	0.13	0.13	54.35
Midnapore	11 to 13	0.72	0.46	1.54	1.67	5.49	11.43	11.60	10.93	8.66	6.14	0.43	0.01	59.08
Booghly	12	0.61	1.48	2.18	3.68	5.23	10.65	11.97	12.31	7.88	3.94	0.41	0.15	60.49
Howrah	8 to 19	0.49	1.52	2.79	2.31	3.95	12.71	12.99	13.00	10.00	5.05	0.35	0.10	65.26

Speaking generally, we may say that the rain-fall of this division varies between 50 and 70 inches, and that the stations in the south, and therefore near the sea-coast, receive a heavier rain-fall than the northern ones. There is also apparently a diminution of rain-fall from the east towards the westerly portion of this division, but this is perhaps not so marked as is the case in the other divisions.

Bhagulpore.—This is one of the Behar divisions, and is therefore situated at a considerable distance from the sea, and consequently the rain-fall is here less than in the divisions formerly discussed. The wind directions are determined at two stations,

RAIN-FALL in the BHAGULPORE DIVISION in INCHES.

Names of Stations.	Number of Years of Records.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Year.
Divisional Average	4 to 20	0.51	1.26	0.51	1.06	2.96	9.09	12.72	11.24	9.90	3.26	0.03	0.04	52.58
Monghyr	19 to 20	0.39	0.57	0.42	0.42	1.55	6.12	11.51	10.90	8.05	3.61	0.04	0.10	43.68
Bhagulpore	18 to 19	0.46	0.57	0.34	1.09	2.26	8.47	11.03	10.73	7.67	5.05	0.01	0.08	47.76
Purneah	6 to 7	0.40	0.43	0.21	1.84	2.56	12.36	14.90	13.62	10.98	3.88	—	0.05	61.23
Mya Doomka	6	0.44	0.72	0.71	1.19	3.39	10.72	13.51	13.78	9.49	3.08	0.01	0.03	57.07

From this table it will be seen that no heavy rain-fall takes place in this division until June, and generally towards the close of this month, whilst the rains almost cease by the beginning of October; the wettest months are July and August, and in September it is clear that there is a weakening of the monsoon current.

Speaking generally, the stations in the south and east of this division, and those lying nearest to the line of the Himalayas, receive a greater rain-fall than those in the west. This is illustrated by the fact that Purneah receives an annual rain-fall of 61.23 inches, whilst Monghyr receives only 43.68 inches. The former station is only 65 miles from the foot of the Himalayas, whilst Monghyr is, more or less, protected from the monsoon winds by the rocky and elevated country of Hazaribagh, which stretches to the south of this district. The average rain-fall of this division may be said to vary between 40 and 60 inches.

Orissa.—This division, although one of the most westerly in the provinces under the Lieutenant-Governor of Bengal, receives ordinarily a fairly large proportion of rain, larger indeed than the three

divisions previously described. This is, however, accounted for by the fact that it lies on the sea-coast, and therefore receives its portion of the monsoon current in its original humid condition.

As might be expected, the wind directions are here somewhat different to those of other districts. In January the wind instead of being north-west or north is usually north-east, whilst as early as February the influence of the south winds begins to be felt; in March they blow steadily from a decidedly south-westerly direction, and continue at or almost this quarter until September; at the middle or end of October the wind goes round to the north-west, and continues northerly until the end of the year. In this division the rain is brought entirely by south-westerly winds instead of by south-easterly winds, as is the case in most of the other divisions of this province.

There are 10 rain-fall recording stations here, and the periods for which observations are available vary between 4 and 19 years. The average monthly rain-fall for the whole division and for some of the principal stations is shown in the following table:—

RAIN-FALL in the ORISSA DIVISION in INCHES.

Names of Stations.	Number of Years of Records.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Year.
Divisional Average	4 to 19	0.51	0.73	0.82	1.62	2.83	10.37	12.98	11.46	9.64	7.59	1.34	0.22	60.11
Cuttack	16 to 18	0.54	0.35	0.94	1.52	2.09	10.39	12.32	10.80	9.68	6.50	0.98	0.52	56.63
False Point	10	0.46	0.58	1.19	1.42	2.58	11.36	16.06	13.51	11.41	13.73	3.11	0.13	76.04
Pooree	17 to 20	0.22	1.15	0.61	1.14	2.27	7.99	9.43	11.85	9.29	8.45	1.98	0.72	53.10
Balasore	14 to 16	0.94	1.24	1.68	2.54	4.26	10.54	11.22	12.20	12.27	7.48	0.59	0.12	65.78

The rain-fall of this division may be said to vary between 50 and 75 inches, and other things being equal, the stations near the sea-coast will receive a heavier fall of rain than those in the interior. This is clearly shown by the pair of stations, False Point, which is on the coast, and which has an average annual rain-fall 76.04 inches, and Cuttack, which is some 50 miles inland, only receives 56.63 inches.

Chota Nagpore.—This division includes a considerable tract of elevated land, which in the case of Hazaribagh is as high as 2,010 feet. Most of the country is indeed, more or less, elevated and undulating, and also much covered with jungle. As might therefore be expected, the meteorological conditions of different parts of the division vary somewhat according to the elevation and position of the stations.

At one station only in this division is the wind direction recorded, and these observations have been made for the last 10 years. Starting in January

with a well-defined north-westerly wind, it generally becomes more and more westerly until June, when it becomes south-west, and from this quarter the first considerable quantities of rain come; the wind afterwards becomes more southerly, and in September south-easterly, but in October it passes back to the north-west direction. It is during July and August that the greater part of the rain falls, when the wind is nearly south, whilst by the beginning of October the rains have almost ceased. During the cold weather months also usually small quantities of rain fall, but this is apparently due to the winter anti-monsoon current, as was explained in the general description of monsoon currents in Bengal. This division is represented by seven rain-fall recording stations from which statistics are available for periods varying from 4 to 20 years.

The average monthly rain-fall of the whole division, together with that of some of the principal stations, is here given in a tabular form:—

RAIN-FALL in the CHOTA NAGPORE DIVISION in INCHES.

Names of Stations.	Number of Years of Records.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Year.
Divisional Average	4 to 20	0.61	0.94	0.85	0.76	1.64	8.64	12.95	11.75	8.23	3.43	0.09	0.10	49.99
Hazaribagh	15	0.48	0.69	0.62	0.35	1.00	8.62	13.05	12.33	7.26	3.60	0.24	0.09	48.33
Ranchee	16 to 18	0.92	1.04	1.31	0.58	1.52	7.43	12.50	10.90	7.81	3.45	0.13	0.09	47.68
Chybassa	7 to 8	0.69	0.83	1.24	0.95	2.90	8.62	13.61	12.03	9.47	4.17	0.14	0.12	54.77
Puralia	10 to 12	0.55	0.78	0.78	0.93	1.53	8.55	11.36	11.92	6.80	4.37	0.08	0.19	47.84

The rain-fall of this division may be said to vary between 45 and 55 inches, about one-half of which is usually received in the two months July and August. Generally speaking, there is a diminution

in the amount of rain-fall in the stations from east to west and from north to south. Thus Hazaribagh has a mean rain-fall higher than Manbhoon, which is situated 70 miles to the eastward, and Chybassa

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again has an annual rain-fall 6 or 7 inches higher than Hazaribagh, which is 100 miles to the northward. As a rule, the monsoon commences rather later and closes rather sooner in the district of Chota Nagpore than it does in the more southerly and westerly districts of Bengal.

Patna.—This is the most westerly and northerly of the divisions in this province, and therefore, as before pointed out, the average rain-fall will be the smallest. In all the Behar stations the mean rain-fall is low, and in most respects their climate is similar to that of the North-Western Provinces. In this division there are two stations, Patna and Gya, at which the wind directions are recorded, and the average of 10 years observations at these places shows that, as in the case of Chota Nagpore, in the early months of the year there is a strong preponderance of westerly winds; there is, however, one very curious point about the wind directions here, that following on the westerly winds we have northerly and north-easterly

ones, and finally in July the winds become almost due east. This change of direction is the reverse of what usually occurs. At the end of July the winds become south-east or east-south-east, and it is from this quarter that the vapour-bearing current reaches this division. In October the wind again goes round to the north-west and the rains cease. Before, however, the south-east and east-south-east winds can reach the division, they have to pass over a small tract of elevated ground as that in the Sonthal Pergunnah district, and consequently they have already deposited a considerable portion of their moisture before reaching this division. The rain-fall here is accordingly light, varying from nearly 40 up to 55 inches. In this district there are 22 rain-fall recording stations which have furnished returns for periods varying between 4 and 29 years. The average monthly divisional rain-fall, together with that of some of the principal stations in the division, is given in the following table:—

RAIN-FALL in the PATNA DIVISION in INCHES.

Names of Stations.	Number of Years of Records.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Year.
Divisional Average	4 to 20	0.63	0.45	0.46	0.54	1.45	7.71	12.12	10.73	8.57	2.34	0.02	0.09	45.11
Patna -	17 to 19	0.65	0.49	0.25	0.30	1.32	6.87	9.77	8.51	7.47	2.63	0.13	0.15	38.54
Gya -	11 to 13	0.72	0.44	0.47	0.35	0.40	6.17	11.78	9.72	6.89	3.32	—	0.09	40.35
Arrah -	17 to 19	0.84	0.45	0.59	0.76	1.06	7.10	12.91	10.04	9.65	2.63	0.21	0.07	46.31
Mozufferpore -	13 to 15	0.71	0.33	0.62	0.63	1.87	6.26	10.51	9.68	9.16	3.67	0.03	—	43.47
Durbhunga -	6	0.33	0.18	0.36	0.88	1.69	7.24	12.89	9.84	10.90	1.81	—	0.07	46.19
Chupra -	17 to 20	0.68	0.35	0.50	0.52	0.93	5.93	8.77	8.79	7.03	2.62	0.02	—	36.14
Motihari -	11 to 12	0.37	0.18	0.83	0.67	2.38	8.81	10.34	11.31	9.27	3.87	—	0.14	48.17

In this division the rain-fall appears to be more generally distributed than is the case in the other divisions, and it is difficult to trace any general principle in the slight variations which occur; apparently however, a line through the middle of this division following nearly the course of the Ganges will represent the line of least rain-fall, whilst north and south of this there is increased precipitation of rain.

The monsoon commences in this division about a fortnight later, and ends rather earlier than in South and Eastern Bengal, and the greater portion of the rain-fall is in the months of July and August. This division also usually receives a certain portion of the winter rains brought by the winter anti-monsoon current.

In concluding our review of the rain-fall of these divisions, we may make the following general state-

AVERAGE WIND DIRECTIONS in BENGAL.

Names of Stations.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
Sibsagar -	N. 63 E.	N. 65 E.	N. 61 E.	N. 56 E.	N. 44 E.	N. 89 E.	S. 34 W.	N. 6 E.	N. 67 E.	N. 72 E.	N. 63 E.	N. 74 E.
Goalpara -	S. 80 E.	N. 56 E.	N. 80 E.	N. 87 E.	S. 86 E.	S. 76 E.	S. 55 E.	S. 15 E.	S. 67 E.	S. 85 E.	S. 87 E.	S. 87 E.
Silchar -	S. 22 E.	S. 23 E.	S. 60 E.	S. 82 E.	N. 71 E.	N. 57 E.	N. 21 E.	S. 49 W.	S. 42 W.	S. 46 E.	S. 74 E.	S. 55 E.
Chittagong -	N. 26 W.	N. 40 W.	S. 60 W.	S. 13 W.	S. 7 W.	S. 30 E.	S. 42 E.	S. 31 E.	S. 27 E.	N. 19 W.	N. 19 W.	N. 24 W.
Dacca -	N. 50 W.	S. 79 W.	S. 22 W.	S. 8 E.	S. 21 E.	S. 19 E.	S. 21 E.	S. 16 E.	S. 78 E.	N. 74 E.	N. 17 W.	N. 34 W.
Darjeeling -	S. 50 W.	S. 65 W.	S. 67 W.	S. 68 W.	S. 51 W.	S. 14 W.	S. 12 E.	S. 13 E.	S. 23 W.	S. 48 W.	S. 38 W.	S. 38 W.
Calcutta -	N. 38 W.	S. 81 W.	S. 32 W.	S. 3 W.	S. 11 E.	S. 4 E.	S. 11 E.	S. 17 E.	S. 27 E.	N. 48 W.	N. 17 W.	N. 26 W.
Saugor Island -	N. 7 E.	S. 68 W.	S. 41 W.	S. 25 W.	S. 17 W.	S. 21 W.	S. 29 W.	S. 27 W.	S. 8 W.	N. 11 E.	N.	N. 12 E.
Jessore -	N. 21 W.	N. 63 W.	S. 66 W.	S. 12 W.	S. 7 E.	S. 19 E.	S. 16 E.	S. 23 E.	N. 63 E.	N. 1 E.	N. 10 W.	N. 10 W.
Berhampore -	N. 35 W.	N. 65 W.	S. 79 W.	S. 8 W.	S. 35 E.	S. 37 E.	S. 44 E.	S. 45 E.	S. 45 E.	N. 3 W.	N. 20 W.	N. 26 W.
Burdwan -	N. 38 W.	N. 57 W.	S. 72 W.	S. 39 W.	S. 4 W.	S. 16 E.	S. 21 E.	S. 40 E.	S. 16 E.	N. 16 E.	N. 15 W.	N. 25 W.
Monghyr -	S. 72 W.	S. 73 W.	N. 83 W.	N. 45 E.	N. 71 E.	N. 85 E.	S. 84 E.	S. 69 E.	S. 81 E.	S. 82 W.	S. 87 W.	S. 69 W.

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Names of Stations.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
Purneah -	N. 77 W.	S. 80 W.	N. 81 W.	—	N. 80 E.	—	—	—	S. 77 E.	N. 49 W.	N. 73 W.	N. 79 W.
Cuttack -	N. 61 E.	S. 9 W.	S. 19 W.	S. 16 W.	S. 5 W.	S. 23 W.	S. 42 W.	S. 48 W.	S. 7 W.	N. 30 E.	N. 17 W.	N. 5 E.
False Point -	N. 45 E.	S. 27 W.	S. 46 W.	S. 44 W.	S. 36 W.	S. 49 W.	S. 63 W.	S. 63 W.	S. 32 W.	N. 40 E.	N. 20 E.	N. 30 E.
Hazaribagh -	N. 64 W.	N. 69 W.	N. 78 W.	N. 73 W.	S. 39 W.	S. 30 W.	S. 13 E.	S. 41 W.	S. 57 E.	N. 43 W.	N. 49 W.	N. 58 W.
Patna -	N. 78 W.	N. 75 W.	N. 72 W.	N. 30 W.	N. 41 E.	N. 68 E.	N. 82 E.	S. 67 E.	S. 84 E.	N. 33 W.	N. 66 W.	N. 79 W.
Gya -	N. 59 W.	N. 85 W.	N. 89 W.	N. 69 W.	N. 31 E.	N. 84 E.	S. 69 E.	S. 59 E.	S. 76 E.	N. 43 W.	N. 23 W.	N. 65 W.
Durbhanga -	—	—	—	—	—	—	—	—	—	—	—	—

AVERAGE RAIN-FALL in the DIVISIONS of BENGAL in INCHES.

Names of Stations.	Number of Stations in Division.	Number of Years.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Year.
Assam -	21 to 23	4 to 20	0.86	1.83	3.90	9.57	14.53	22.86	23.13	18.05	14.11	9.34	0.68	0.29	115.15
Chittagong -	6 to 7	4 to 19	0.71	0.83	2.04	4.96	10.37	22.17	21.11	18.25	11.99	6.89	0.87	0.21	100.40
Dacca -	11 to 14	4 to 16	0.71	1.12	1.79	4.23	8.50	16.48	15.27	12.74	10.57	4.86	0.20	0.13	76.60
Cooch Behar -	5	4 to 7	0.73	0.41	1.34	5.53	10.46	30.14	29.69	26.59	22.81	6.73	0.11	0.12	134.57
Rajshahye -	10	5 to 20	0.52	0.92	1.09	3.34	6.68	15.21	14.67	12.48	12.37	5.09	0.30	0.11	72.73
Presidency -	25 to 26	4 to 47	0.37	1.10	1.31	2.73	5.15	11.63	10.70	10.98	8.43	4.95	0.32	0.10	57.98
Burdwan -	15	4 to 20	0.56	1.30	1.42	2.16	4.14	10.00	11.47	11.65	8.62	5.29	0.33	0.17	57.11
Bhagulpore -	12 to 15	4 to 20	0.51	1.26	0.51	1.06	2.06	9.09	12.72	11.24	9.90	3.26	0.03	0.04	52.58
Orissa -	10	4 to 19	0.51	0.73	0.82	1.62	2.83	10.37	12.98	11.46	9.61	7.59	1.34	0.22	69.11
Chota Nagpore -	7	4 to 20	0.61	0.94	0.85	0.76	1.64	8.64	12.95	11.75	8.23	3.43	0.69	0.10	49.99
Patna -	22	4 to 20	0.63	0.45	0.46	0.54	1.45	7.71	12.12	10.73	8.57	2.34	0.02	0.09	45.11

With reference to the question "within what limits can the rain-fall vary," and also with reference to the three succeeding questions, it must be explained that the Meteorological Department receives no statistics of any kind as to the agricultural conditions of this province; consequently, it is unable to give any detailed or definite information on these subjects. Generally it may be stated that it is not so much the *absolute* amount of rain which is received by any particular district that determines whether the crops are good or bad, but rather that this depends upon the rain which comes, falling at seasonable times. Again, as the time at which rain may be acceptable will vary according to whether the land cultivated is high or low-lying, or whether backward or forward in cultivation, it would be a difficult matter to say exactly when rain is really or generally required.

Also an excessive rain-fall at many parts of the year is just as bad for the crops as a want of rain, and a flood is in all probability as disastrous as a drought.

Again, in the majority of instances, one inch of rain falling daily on four alternate days may do more good than a continued drizzle of half an inch of rain on each of eight consecutive days; and there is no doubt that either of the former would do vastly more good than a violent rain in which 4 inches fall, say, in a couple of hours. Looking at these considerations, it is not possible to do more than advance the most general of all general statements, and say that *in all probability* a variation of more than 10 or even 15 per cent., either above or below the average rain-fall in each month (provided only the fall is seasonably distributed), might not be attended with serious consequences; but that *in all probability* a variation of 25 or 30 per cent. would cause damage, whether the variation was above or below the average fall, and of the two the smaller quantity of rain would produce the greater damage.

The last and only other question which could possibly be dealt with from the records of the Meteorological Department is the second half of the last question in paragraph 1, namely, "what is the combination of circumstances under which the worst results have been produced."

Now undoubtedly the worst results which have been produced are those of the two famine years 1865 and 1873, and an examination of the distribution of rain-fall in these two years in comparison with the average fall will perhaps throw some light on this question.

In order to illustrate this difference of the average rain-fall and of the rain-fall of 1865, a map is attached which shows the average rain-fall of Bengal in red lines, whilst the blue figures are the rain-fall of 1865. Inspection of this will show at a glance that the general rain-fall was not very deficient except in Orissa; but Statement I. will show clearly that the rains almost entirely ceased about the middle of September.

The total quantity of rain-fall for the year was not unusually small in the larger part of Bengal, but it fell abnormally and unseasonably. Much rain fell in the early months of the year before it was of much good, for the usual sowing time had not arrived, and the rains which usually fall in the latter end of September and commencement of October, and which are so essential to the crops, entirely failed. The crops, however, in the more humid districts of Eastern Bengal (where the rain-fall commences earlier) ripened notwithstanding the early cessation of the rains; but in the drier districts of Orissa and Western Bengal the crop was prematurely cut off. In Orissa, the general fall of rain having also been very deficient, the results were much worse than in the greater part of Western Bengal.

The season 1873 was also one which was marked by famine in these provinces, and the cause of this

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is clearly shown by the rain-fall statistics of that year.

A chart of the rain-fall of 1873, compared with the average rain-fall of these provinces, was prepared for the Meteorological Report for 1873, from which it appears that, generally speaking, in the year 1873 the rain-fall of Bengal was very deficient. As, however, this chart only shows us the general result of the year, Statement II. has been prepared showing the monthly divisional rain-fall of 1873 compared with the averages of many years.

From this it may be again seen that with rare local exceptions the rain-fall of 1873 was considerably below the average, and that also, as a general rule, the deficiency was not confined to any one portion of the year, but that it was fairly distributed throughout the season. As might be expected, however, the deficiency was not equally distributed throughout the province, and the variations exhibited some peculiar features which led Mr. Blanford to believe that "while the monsoon current as a whole was either unusually weak or unusually dry, that portion which came from the Bay of Bengal failed to a greater extent than that which came from the Arabian Sea." This failure of the rains was greatest in the division of Rajshahye, where the deficiency amounted to between 40 and 60 per cent. of the average, and in the Bhagulpore division generally it was almost equally great. In Northern Tihoot the deficiency averaged from 25 to 40 per cent. of the normal fall, but in the Patna division generally, and in the Monghyr district of the Bhagulpore division, the deficiency was not so great, and on the average it was scarcely so much as 20 per cent. In the Chota Nagpore division the fall was somewhat in excess of the average, and at the two stations Hazaribagh and Ranchee the excess amounted to about 15 per cent. Even in these districts, however, the partial failure of the crops, which is said to have happened, appeared to have been produced rather by the early cessation of the rains than by any absolute deficiency in their total quantity.

In the deltaic districts of Lower Bengal the deficiency was on the average from 30 to 40 per cent.; but this amount varied, and in the western district the rain-fall was much nearer the normal amount than in the eastern. In one station on the west, at Sooree, there was indeed an actual excess above the average fall. In the eastern division of this Presi-

dency the deficiency was about 20 per cent. of the average fall; but even this statement is liable to exceptions, for at Noakholly 17 per cent. above the average fell. The greatest local deficiency appeared to be in the Assam Hills, for in the case of Chera-poonjee the rain-fall was no less than 241 inches below the average, or about 46 per cent. of the normal amount. The rain-fall in India in this year appeared to be above the average on a line running nearly north and south through Hazaribagh, Ranchee, Jhansi, and Agra, that is, on or about the line where the monsoon current from the Bay of Bengal meets with the monsoon current coming from the Arabian Sea.

In the two last months of the rains (September and October), which perhaps may be considered almost of the greatest importance from an agricultural point of view, there was very considerable deficiency, and it may be noticed that in those divisions which suffered most from famine that the rain-fall was so considerably deficient as to almost cease in September, and in all probability this early cessation of the rains was one of the chief, if not the chief, cause of the famine which occurred.

Mr. Blanford, in his review of the Meteorology of the year 1873, says, "I think it not improbable that the dryness of the year was in great part due to a persistent barometric depression in the south-east of the Bay, probably extending also both eastward; but the irregular (barometric) depression in the upper part of the Gangetic valley, and the high pressure in Eastern Bengal, were certainly also influential in the result, as has already been shown at a previous page of the report."

So far, then, as our present experience goes, it appears that the worst results have been produced by the failure of the latter part of the rains, namely, in the months of September and October, but, as before pointed out, this affects the drier divisions of the western part of this Presidency to a greater extent than the eastern and more humid divisions.

Partial failure of the monsoon at the commencement or at the middle of the rainy season will of course be serious; but it may only be the means of throwing back the crops, and such would be the usual result; but failure of the rains at the close of the monsoon season means destruction of the principal crop of the year, upon which agriculturists in this province principally rely.

No. 1.—STATEMENT showing the RAIN-FALL of 1865 compared with the AVERAGE RAIN-FALL.

Division.	Jan- uary.	Feb- ruary.	March.	April.	May.	June.	July.	August.	Septem- ber.	Octo- ber.	Novem- ber.	Decem- ber.	Total of 1865.	Total of Average.												
	1865. Average.	1865. Average.	1865. Average.	1865. Average.	1865. Average.	1865. Average.	1865. Average.	1865. Average.	1865. Average.	1865. Average.	1865. Average.															
Chittagong -	0.27	0.71	1.15	0.83	0.73	2.04	5.65	4.96	14.13	10.37	23.13	30.32	21.11	10.05	18.25	7.63	11.99	2.70	6.89	—	0.87	—	0.21	96.71	100.40	
Dacca -	—	0.71	1.17	1.12	1.18	1.79	21.93	4.23	19.06	8.50	21.28	16.43	24.91	15.27	8.56	12.74	5.44	10.57	1.38	4.56	0.53	0.20	—	0.13	103.01	76.60
Cooch Behar -	—	0.73	—	0.41	—	1.34	—	5.53	—	10.46	—	30.14	—	29.00	—	26.59	—	22.81	—	6.73	—	0.11	—	0.12	—	134.57
Rajshahye -	—	0.52	2.23	0.92	1.73	1.00	6.35	3.34	9.27	6.08	14.58	15.21	20.85	14.67	8.42	12.48	6.49	12.37	0.52	5.09	—	0.30	0.87	0.11	71.31	72.78
Presidency -	0.16	0.57	2.22	1.10	1.99	1.31	3.19	—	15.88	5.15	8.19	11.63	11.09	10.70	6.83	10.98	10.13	8.43	—	4.96	—	0.32	—	0.10	59.68	57.98
Burdwan -	—	0.56	2.23	1.39	3.23	1.42	3.93	2.16	10.90	4.14	11.17	10.00	12.45	11.47	6.77	11.65	8.20	8.62	0.17	5.29	—	0.33	0.03	0.17	59.08	57.11
Bhagulpore -	0.07	0.51	1.00	1.26	1.47	0.51	2.50	1.06	7.37	2.96	4.92	9.09	16.10	12.72	10.92	11.24	5.50	9.90	—	3.26	—	0.03	0.95	0.04	50.80	52.58
Orissa -	0.12	0.51	1.57	0.73	3.27	0.82	2.85	1.62	12.27	2.83	4.92	10.37	5.10	12.98	6.92	11.46	7.25	9.64	0.15	7.59	—	1.34	—	0.22	44.12	60.11
Chota Nag- pore.	0.50	0.61	2.50	0.91	1.95	0.85	0.40	0.76	4.20	1.64	5.10	8.64	11.40	12.95	8.30	11.75	4.20	8.23	—	3.43	—	0.09	—	0.10	38.65	49.99
Patna -	0.08	0.63	0.63	0.45	1.78	0.46	2.14	0.54	2.75	1.45	2.12	7.71	12.06	12.12	5.98	10.73	2.82	8.57	—	2.31	0.07	0.02	0.25	0.09	30.68	45.11

RAINFALL.

No. 2.—STATEMENT showing the RAIN-FALL of 1873 compared with the AVERAGE RAIN-FALL.

Division.	Jan- uary.	Feb- ruary.	March.	April.	May.	June.	July.	August.	Septem- ber.	Octo- ber.	Novem- ber.	Decem- ber.	Total of 1873.	Total of Average.												
	Average.	Average.	Average.	Average.	Average.	Average.	Average.	Average.	Average.	Average.	Average.	Average.														
	1873.	1872.	1873.	1873.	1873.	1873.	1873.	1873.	1873.	1873.	1873.	1873.														
Chittagong -	0.41	0.71	0.06	0.83	1.32	2.04	6.41	4.96	6.40	10.37	19.99	22.17	10.96	21.11	20.02	18.25	8.73	11.99	4.27	6.89	0.41	0.87	0.67	0.21	88.65	100.40
Dacca -	0.10	0.71	0.14	1.12	0.95	1.79	4.78	4.23	5.88	8.50	9.77	16.48	15.10	15.27	15.63	12.74	6.92	10.57	1.55	4.86	0.34	0.20	0.64	0.13	61.85	76.60
Cooch Behar -	0.10	0.73	0.22	0.41	1.32	1.34	7.03	5.53	3.81	10.46	35.99	30.14	21.35	29.60	20.44	26.50	14.48	22.81	0.25	6.73	—	0.11	0.73	0.12	103.17	134.57
Rajshahye -	0.26	0.52	0.14	0.92	1.03	1.09	3.64	3.34	1.48	6.68	10.58	15.21	9.31	14.67	11.75	12.48	5.16	12.37	0.25	5.09	0.04	0.30	0.25	0.11	48.87	72.78
Presidency -	0.12	0.57	0.10	1.10	1.09	1.31	2.12	2.73	3.31	5.15	4.59	11.63	13.81	10.70	11.87	10.98	2.32	8.43	0.82	4.96	0.29	0.32	0.24	0.10	40.68	57.98
Burdwan -	0.06	0.56	0.01	1.30	1.52	1.42	2.00	2.16	3.56	4.14	4.41	10.00	16.97	11.47	11.83	11.65	5.48	8.62	0.69	5.29	0.17	0.33	0.51	0.17	47.21	57.11
Bhagulpore -	0.24	0.51	—	1.26	0.84	0.51	0.97	1.06	0.74	2.96	4.78	9.00	12.21	12.72	10.61	11.24	4.94	9.90	0.03	3.26	0.01	0.03	0.16	0.04	35.53	52.58
Orissa -	0.08	0.51	—	0.73	1.00	0.82	1.03	1.62	3.08	2.88	3.71	10.37	11.48	12.98	12.87	11.46	6.57	9.64	5.58	7.59	0.52	1.34	0.50	0.21	46.45	60.11
Chota Nag- pore.	0.03	0.61	0.01	0.94	1.55	0.85	0.91	0.76	1.14	1.64	2.76	8.64	19.49	12.95	13.27	11.75	7.75	8.23	0.29	3.43	0.04	0.09	0.19	0.10	47.43	49.99
Patna -	0.31	0.63	0.03	0.45	1.42	0.46	0.30	0.54	0.52	1.45	3.56	7.71	15.54	12.12	9.64	10.73	2.24	8.57	0.01	2.34	0.01	0.02	0.12	0.09	33.70	45.11

CHAP. I. QN.

BENGAL.

Mr. Pedler.

CENTRAL PROVINCES.

The watersheds are these,—

The Vindhyan.
The Nerbudda.
The Tapti.
The Satpura.
The Godavari.
The Mahanadi.

The "Vindhyan" comprises the north and south escarpments of the Vindhyan range; the Ganges receives the waters of the former, and the Nerbudda those of the latter; the districts of Saugor, Damoh, and the subdivision Murwara are in this area.

The "Nerbudda" embraces the valley of the Nerbudda situated between the Vindhyan and Satpura ranges; it includes the districts of Jubbulpore, Narsinghpur, Hoshangabad, and Nimar. The Nerbudda river receives the waters of this tract.

The "Tapti" lies to the west of the main spur of the Satpura range; and in the Central Provinces is confined to the subdivision of Burhanpur and a part of Betul; it is drained by the Tapti river.

The "Satpura" division comprises the high lands of the Central Provinces running from east to west; the districts are Mandla and Balaghat, Seoni, Chhindwara and Betul. The drainage of the northern slopes falls into the Nerbudda, that of the western reaches the sea by means of the Tapti, and that of the southern is carried by the Godavari into the Bay of Bengal.

The "Godavari" comprises the plain country south of the Satpuras; the districts from east to west are Bhandara and Chanda, Nagpur and Wardha; the Godavari river receives the drainage of this tract.

The "Mahanadi" division comprises the plains of Chhattisgarh and Sambalpur; this tract is drained by the Mahanadi.

These divisions indicate the rain-fall systems.

Striking the most western portion of the provinces in the Tapti division, the monsoon currents are divided by the Satpura range into the northern and southern, local peculiarities of hill and forest increasing or diminishing the amount of rain-fall. The higher ranges of hills, as Pachmarhi or the Mahadeo group, and the more eastern or trap formation, as the Moh-toor range, receive the heaviest rain-falls, which reach about 80 inches; whilst Burhanpur receives the lowest, or on an average about 28. Passing eastwards the rain-fall increases: thus Khandwa receives about 35, Hoshangabad 47, Narsinghpur 55, Jubbulpore 60, and the Vindhyan districts about 55. Similarly the hill districts receive from 40 on the western border to 60 on the eastern. Passing onwards over the southern part of the provinces, the monsoon strikes the Wardha district first, where the fall is about 35 inches, Nagpur receives 40, Chanda 43, and Bhandara 50, the plains of Chhattisgarh receive between 40 and 50, and the most eastern district, Sambalpur, receives 55 inches; this district and part of Chhattisgarh receives a portion of its rain-fall from a north-easterly direction.

The south-west monsoon commences in June; occasionally within the first 10 days; at other times it is delayed until the third week; it continues until some time in September and occasionally until October.

The eastern districts receive also some rain from a north-easterly direction, but particular observation has not hitherto been directed to this question.

Rain-gauges are kept at head-quarters of districts and of tahsils; also at meteorological observatories, where the officials attached to the Courts and observatories respectively keep up the registers. The following table gives the results recorded for the past 10 years. Registers are also kept at dispensaries.

AVERAGE RAIN-FALL registered in the several DISTRICTS of the CENTRAL PROVINCES for 10 YEARS, from 1868-1877.

Years.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total.
1868 -	1.62	0.28	0.50	0.07	0.46	7.25	9.61	5.76	4.80	0.09	—	0.07	30.51
1869 -	0.08	0.12	0.77	0.17	0.37	4.26	15.54	12.51	10.96	3.93	0.02	0.67	49.40
1870 -	1.22	0.52	1.02	0.52	0.02	10.76	16.94	8.30	7.41	3.27	0.59	—	50.17
1871 -	0.56	0.49	0.04	0.13	1.03	12.54	15.37	6.61	10.96	0.13	0.22	0.18	48.26
1872 -	0.03	0.06	0.35	1.00	0.05	8.63	15.80	14.32	8.53	1.88	0.04	0.18	51.26
1873 -	0.21	0.36	0.53	0.07	0.76	3.11	13.29	9.99	11.35	0.23	0.01	0.25	40.16
1874 -	0.45	0.23	0.19	0.04	0.69	12.80	16.82	15.82	6.83	0.90	0.05	0.03	54.85
1875 -	0.26	0.49	0.01	0.11	0.48	10.92	20.60	10.39	10.22	2.11	—	0.09	55.69
1876 -	—	—	0.17	—	0.12	3.89	17.44	13.66	8.89	0.41	—	—	44.58
1877 -	2.98	0.90	0.66	1.88	—	9.13	10.04	12.34	3.75	2.63	0.24	1.45	48.19
Mean -	0.74	0.30	0.42	0.40	0.62	8.33	15.14	10.97	8.37	1.56	0.12	0.34	47.31

CENTRAL PROVINCES.

Dr. Barter
and
Mr. Nicholls.

CHAP. I. QN. 1.

CENTRAL PROVINCES.

Dr. Barter
and
Mr. Nicholls.

In a report on the variation of rain-fall in tropical India, dated 18th of May 1877, by the Meteorological Reporter to the Government of India, the rain-fall for Nagpur and Jubbulpore for a series of years is given. Thus the average rain-fall for Nagpur for the years 1855-1876 inclusive was 39·85; the highest annual rain-fall was 57·75 inches in 1867, and the lowest was 25·49 in 1868. The average for Jubbulpore for the years 1845 to 1876 inclusive was 53·26; the highest being 86·93 in 1874, and the lowest 28·30 in 1868.

The Sanitary Commissioner's statistics show that the average fall for the provinces in 1868 was 30 inches; the Jubbulpore district received 28·3, Raipur 35·8, and Bilaspur 29·0, and in these districts there was a famine; but in Jubbulpore, if not in the other districts, there were predisposing causes; in other districts also, which received light falls, there was considerable distress,—thus in the Seoni district, which received 31·4, although there was not a widespread famine, there was widespread distress; but in this district, when times are hard, a large section of the community subsists on jungle produce, as berries, fruit, roots, &c., or eke out an existence with their aid; here then the effects of scarcity would not be so marked. The average rain-fall for the provinces during the months August, September, and October, for the 10 years ending 1867, and the fall during these months in 1868, is here given.

	Ten years.	1868.
August	9·50	4·60
September	6·40	1·70
October	1·20	0·10

But the amount of rain absolutely required depends, to no small extent, on the nature of the fall. Should this occur in plumps or heavy falls, and, as a necessary consequence, run off the ground and be followed by long breaks, a larger rain-fall will be necessary; but should light constant showers occur with occasional or a few heavy downpours at the critical periods of transplanting and earing—and sufficient to fill tanks—in rice-growing districts, then a smaller quantity in the aggregate will be sufficient.

Again, the nature of the crops raised governs the minimum required; rice-growing lands demand a larger rain-fall than the heavy black soils where wheat, joar, &c. are grown; in the former, if fairly distributed, 35 to 40 inches may be regarded as the minimum; and in the latter 27 to 35, varying in different districts.

But an excessive or an unseasonable rain-fall may also do considerable damage and cause much distress; the unseasonable and, in some places, excessive rain of the past cold season has resulted in a general rust or blight of the wheat crop, a short linseed crop, and destruction of the gram crop and masur.

We consider the minimum for rice lands to be from 35 to 40 inches, varying in different districts, provided also that the distribution be fairly opportune.

For black cotton soils we consider that from 27 to 35 would be absolutely requisite, varying in different districts. But the distribution is not of such vital importance, provided that no considerable portion of this total amount comes in torrents so as to run off and not sink into the soil, and that at least three inches fall late in September. This is of especial importance for the sake of the rabi sowings.

As for the maximum, the black cotton soil could stand 50 inches in the monsoon, provided that there are intervals of sunshine to strengthen and give health to the plants, and to allow of weeding and the banking up of the earth around the roots of the joar and

cotton plants, done by a small plough four or five times in the rains.

For rice lands, provided there are intervals of sunshine, too much rain is difficult to imagine, provided that it does not fall heavily after the middle of October. Kodo and kutki are generally sown on sandy soil and on sloping ground, and so can hardly be injured by excess of rain.

The black cotton soil, after a tolerably good monsoon, has produced fair crops without the aid of winter rain.

Rain not exceeding three or four inches, from the middle of December to the middle of January for the southern districts, extending to a fortnight later for the northern districts, will be of immense advantage, but rain in excess of this amount greatly increases the risk of blight. A long continuance of cloudy weather at this time is still more dangerous.

For the rice districts and tracts rain is absolutely necessary only during the monsoon. Probably the following distribution is necessary to produce fair crops in all these tracts,—Chhattisgarh, Sambalpur, the Bhandara rice country, including Balaghat and Chanda, and the north of Betul and Chhindwara, and the sandy soils of Saugor, Damoh, and Jubbulpore.

June, 2nd half	- 3 inches	Sowing.
July, 1st half	- 4 "	"
July, 2nd half	- 8 "	Transplanting.
August, 1st half	- 8 "	"
August, 2nd half	- 4 "	Sunshine and showers.
September, 1st half	- 6 "	Earing period of early rice.
September, 2nd half	- 7 "	"
October, 1st half	- 4 "	Earing of late rice.
	44 "	

The black* cotton soils require, to produce fair crops:—

June, 2nd half	- 3 inches	Sowings.
July, 1st half	- 4 "	"
July, 2nd half	- 4 "	"
August, 1st half	- 4 "	Showers and sunshine required for weeding operations.
August, 2nd half	- 4 "	"
September, 1st half	- 6 "	Blossoming of cotton and joar.
September, 2nd half	- 7 "	"
October, 1st half	- 2 "	Rabi sowing.
December, 2nd half	- 1 "	"
January, 1st half	- 2 "	Southern districts, Earing of rabi crops.
January, 2nd half	- 2 "	Northern districts.
	38 "	for southern districts.
	39 "	for northern districts.

These figures are intended to cover all districts. Some localities could do fairly well with something less.

The sowings and the maintenance of the crops, including the transplanting of the rice, depend on the south-west monsoon.

It is doubtful whether we have any other than the south-western monsoon. But the October showers called the "Hathi," or elephant showers, come from the east or south-east.

These rains are partial and uncertain, but are of great importance to strengthen the late rice and joar and cotton when in blossom, and to keep the rabi lands from hardening, and to reduce the temperature of the surface of the earth to fit it for the germinating of the seed. The winter showers generally come from the north-east, and strengthen the wheat and other crops at the critical time of earing or blossoming.

* Nagpur division, except the Bhandara rice field; the west of Chhattisgarh; the Jubbulpore division, save the north of Saugor, of Damoh, and of Jubbulpore; and all the Nerbudda division, except the north of Betul and Chhindwara.

BERAR.

The province of Berar, the area of which is 17,711 square miles, is geographically divided into three sections.

On the northern side is the Melghat forming a portion of the Satpura range of mountains. Its area is 1,649 square miles.

On the southern side is the Balaghat or up-land country, comprising the Ajunta ridge, and sloping down southwards from thence to the Hyderabad territory, and between these two ranges of hills lies the Pyanghat or low-land country, an extremely fertile valley running the entire length of the province from east to west, with a breadth of from 40 to 50 miles.

The Melghat is chiefly forest land; there is but little cultivation.

The Balaghat country includes the whole of the Wun and Basim districts, and the greater portion of the Buldana district.

The Pyanghat country includes the whole of the Amraoti and Akola districts, the Ellichpur district (except the Melghat), and one Taluka of the Buldana district.

Roughly speaking, the Balaghat and Pyanghat tracts are about equal in area, each comprising about 8,000 square miles.

The monsoon rains are heaviest in the Melghat, and lightest in the Pyanghat country, the average

rain-fall at the head-quarter stations in these three divisions being as follows:—

Inches.

Melghat	-	-	-	-	57·57
Balaghat	{	Wun	-	-	41·08
Basim		-	-	38·66	
Buldana		-	-	29·06	
Average				-	36·26
Pyanghat	{	Amraoti	-	-	32·99
Akola		-	-	28·98	
Ellichpur		-	-	28·06	
Average				-	30·03

Exclusive of the Melghat, the chief drainage of which is northwards into the Tapti river, the average annual rain-fall on the province in the past six years has been 33·88 inches.

The south-west monsoon commences about the second week in June, and continues until the end of September or beginning of October. In normal years we have showers from the east or north-east in December or January which are beneficial for the late crops, but it is on the south-west monsoon that we are really dependent for our rain-fall.

BOMBAY.

The rain-fall of the Bombay Presidency is derived from the south-west monsoon between June and October. From certain natural causes, the quantity of rain precipitated from this current varies greatly and regularly from north to south, being smallest in Sind and greatest in Canara. Thus the average fall from north to south is—

from north to south is—					Inches
Sind	-	-	-	-	8·42
Katch	-	-	-	-	14·30
Kattywar	-	-	-	-	24
Guzerat	-	-	-	-	33
North Konkan	-	-	-	-	68
Bombay	-	-	-	-	73
S. Konkan	{	Colaba	-	-	108
		Vingorla	-	-	112
Kanara—Honawar	-	-	-	-	152

But the line of the Ghats, running parallel to the coast throughout the south of the Presidency from 50 to 30 miles from the sea, causes another variation.

On the Ghats or Sahyadri range the average fall is 215 inches. The plain above them is a high plateau sloping from 2,000 feet above the sea at the Ghats to about 1,400 feet on the east frontier. This plateau may be divided into three parallel tracts—(1.) That immediately east of the Ghats, or West Deccan. The average fall in the West Deccan is 33 inches. (2.) The East Deccan. The average fall of the East Deccan is 23 inches. (3.) The tract between the East and West Deccan, which is drier than either, the rain-fall being 20 inches in the south of Kaladgi and east of Dharwar, and at Siroor (Poona), and Niphad (Nassick.) This is the district which requires protection from failure of the rain-fall. In the extreme East Deccan the fall is larger, owing to the recurve of the monsoon. Especially in September and October the rain-fall is larger in the East Deccan, and particularly in the south part of it, than in the Konkan or Guzerat.

In order to obtain in tabular form a general and concise view of the rain-fall of the Presidency, I have selected the rain records of the following stations, and grouped them as shown below:—

Sind.	Guzerat.	Konkan.	Sahyadri Range.	North Deccan.	South Deccan.	West Deccan.	East Deccan.
Kurrachee.	Surat.	Karwar.	Matheran.	Dhulia.	Satara.	Nasik.	Ahmednagar.
Selwan.	Broach.	Honawar.	Mahabeshwar.	Nasik.	Sholapur.	Malegaon.	Sholapur.
Tatta.	Kaira.	Vingorla.	Igatpuri.	Malegaon.	Kolhapur.	Poona.	Gokak.
Hyderabad.	Godhra.	Ratnagiri.		Ahmednagar.	Belgaum.	Satara.	Hubli.
Umerkot.	Ahmedabad.	Colaba Observatory.		Poona.	Gokak.	Kolhapur.	Nargund.
Nagan.	Boria.	Tanna.			Hubli.	Belgaum.	Kalghatgi.
Shikarpur.	Edar.				Nargund.		Bijapur.
Rohri.	Palanpur.				Kalghatgi.		
Jacobabad.	Rajkot.				Bijapur.		
	Deesa.						

The rain registers of the above stations are sufficient to show with tolerable accuracy the salient features of the rain-fall distribution of the Presidency. The Q 3387.

normal monthly and annual rain-fall for each of these groups of stations is given below:—

CHAP. I. QN. 1.
BOMBAY.
Mr. Chambers.

Districts.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Year.
Sind	0.37	0.23	0.27	0.10	0.14	0.60	2.78	2.82	0.72	0.12	0.12	0.15	8.42
Guzerat	0.02	0.21	0.03	0.02	0.38	4.55	11.32	10.14	5.46	0.56	0.5	0.05	32.89
Konkan	0.56	0.00	0.08	0.21	1.23	31.77	35.72	20.64	11.77	2.90	0.62	0.09	105.59
Sahyadri Range	0.28	0.01	0.23	0.46	0.78	38.23	83.09	59.83	26.75	4.59	0.50	0.13	214.88
North Deccan	0.42	0.05	0.10	0.34	0.76	5.18	4.72	4.29	4.38	2.92	0.66	0.24	24.06
South Deccan	0.15	0.02	0.26	1.00	1.71	5.52	6.68	4.88	3.35	4.24	0.59	0.75	29.15
West Deccan	0.25	0.03	0.15	0.91	1.36	6.94	9.43	6.15	3.86	3.74	0.84	0.30	33.96
East Deccan	0.20	0.03	0.28	0.75	1.56	4.27	3.39	3.57	3.71	4.11	0.44	0.86	23.17

In Guzerat, the Konkan, along the Sahyadri Range, and in the western portions of the Deccan bordering on the Sahyadri Range, the rain comes chiefly from the west and south-west, but it also falls in the monsoon months (June to September), during calms and in unsettled weather. In Sind and in the eastern portions of the Presidency rain seldom falls when the westerly monsoon wind blows with full force, but usually during the temporary cessations of the westerly wind and when the wind is from the eastward. The rain which falls on the Deccan in the month of October comes almost exclusively from the eastward.

With reference to "the effect on the crops of the failure of any of these elements of rain-fall, and the combination of circumstances under which the worst results have been produced," I would point to the great per-centage deficiencies (given below in table (c)) of the rain-fall on the Deccan (particularly in the southern and eastern portions) in the three successive months (August, September, and October). The failure of crops on the Deccan in 1876 appears to have been chiefly due to this continued deficiency of rain.

The most important factor amongst the causes which determine a famine is probably a deficiency of the usual rain-fall. It is of this factor that I possess personal knowledge, and to which my remarks will therefore be confined.

Those portions of the country which have the smallest normal rain-fall will be most subject to famine, and those in which the normal rain-fall is heavy will be freest from it, not only because the rain-fall is usually small in amount in the former districts and large in the latter, but chiefly because the *per-centage variation* of the rain-fall in districts where the fall is normally small, is greater than in those where the fall is usually large.

Sind, the Thar, and portions of Rajputana are examples of regions in which food grains cannot be grown without irrigation, on account of the scantiness of the normal rain-fall; the Konkan and along the Sahyadri Range, of regions of normally heavy rain-fall, in which the fall of any individual year is rarely or perhaps never less than 50 per cent. of the normal quantity, and in which a total failure of the crops will very rarely or perhaps never happen. The remaining districts of the Presidency occupy positions intermediate between these two extremes, and it is in these districts mainly that a deficiency of rain is most severely felt.

The comparative greatness of the per-centage of the rain-fall in districts where the rain-fall is normally small may be illustrated by a consideration of the rain-fall distribution of the famine years 1876 and 1877.

A similar discussion of the per-centage rain-fall distribution of a large number of past years would doubtless be very informing, and would afford a broader basis on which to found any general conclusions, but this is a work requiring special provision for its accomplishment, and therefore at present impracticable.

The most convenient numerical form in which to study the rain-fall for practical purposes appears to be that of per-centages of the average fall. When put into this form the variations of the rain-fall may be taken as a comparative measure of their effects on the crops in different districts, an advantage which cannot be claimed for the numbers representing the absolute variations, for in a district where the average absolute fall is great a variation of a few inches more or less is of little consequence, whereas a variation of the same absolute amounts in districts where the fall is usually scanty might determine the success or failure of agricultural operations. The rain-fall of each district in the monsoon months (June to October), and the total for the year, is given in the per-centage form for the years 1876 and 1877, and in the two following tables:—

(c.) PER-CENTAGES of NORMAL RAIN-FALL in 1876.

Districts.	June.	July.	Aug.	Sept.	Oct.	Year.
Sind	8	173	114	57	—	112
Guzerat	31	107	100	117	—	92
Konkan	72	96	48	60	—	70
Sahyadri Range	47	121	87	44	—	85
North Deccan	87	102	79	25	5	59
South Deccan	55	143	42	33	8	62
West Deccan	63	141	64	29	11	71
East Deccan	55	111	35	31	5	47

(d.) PER-CENTAGES of NORMAL RAIN-FALL in 1877.

Districts.	June.	July.	Aug.	Sept.	Oct.	Year.
Sind	18	8	—	290	117	54
Guzerat	60	30	8	99	612	53
Konkan	88	34	78	81	348	73
Sahyadri Range	66	52	49	69	142	58
North Deccan	124	39	97	85	88	88
South Deccan	139	31	92	303	189	125
West Deccan	128	29	74	165	137	83
East Deccan	149	38	95	268	183	142

The figures given above show what per-centage of the normal fall of each month was received in each district; and the numbers given below show for the same years the *per-centage variation* (i.e., excess or defect) from the normal quantity for each of the wet months of the year, which are June to October in the Deccan, and June to September elsewhere.

(e.) PER-CENTAGE VARIATION of the RAIN-FALL of each DISTRICT in the YEARS 1876 and 1877.

Months.	Sind.	Guzerat.	Konkan.	Sahyadri Range.	West Deccan.	East Deccan.	North Deccan.	South Deccan.
June 1876.	— 92	— 69	— 28	— 53	— 37	— 45	— 13	— 45
July	+ 73	+ 7	— 4	+ 21	+ 41	+ 11	+ 2	+ 43
August	+ 14	—	— 52	— 13	— 36	— 65	— 21	— 58
September	— 43	+ 17	— 40	— 56	— 71	— 69	— 75	— 67
October	—	—	—	—	— 89	— 95	— 96	— 92
June 1877.	— 82	— 40	— 12	— 34	+ 28	+ 49	+ 24	+ 39
July	— 92	— 70	— 66	— 48	— 71	— 62	— 61	— 69
August	— 100	— 92	— 22	— 51	— 26	— 5	— 3	— 8
September	+ 190	— 1	— 19	— 31	+ 65	— 164	— 15	+ 203
October	—	—	—	—	+ 37	+ 83	— 12	+ 89
Sums	686	296	243	307	501	648	321	713
Means	85	37	30	38	50	64	32	71

The mean monthly per-centage variation for each district in the years 1876 and 1877 is obtained by taking the sum of the per-centage variations irrespective of signs, and dividing by the number of months. Arranging below these mean results in the order of the total annual rain-fall of each district, we find that the per-centage variation of the rain-fall is much greater in Sind and in the Deccan, where the normal rain-fall is small, than in the Konkan and Guzerat, where the normal fall is more considerable.

of each district, we find that there is a well-marked similarity of progression in the two sets of numbers:—

	Sahyadri Range.	Konkan.	Guzerat.	West Deccan.	Sind.
July { Normal fall	83.09	35.72	11.32	9.43	2.78
{ Per-centage fall in 1877.	52	34	30	29	8

	Sahyadri Range.	Konkan.	Guzerat.	Deccan, mean of East and West.	Sind.
Total normal annual fall in inches.	215	106	33	29	8
Monthly per-centage variation from normal.	38	30	37	57	85

This conclusion is the same as that given in my "Brief Sketch of the Meteorology of the Bombay Presidency in 1877," from which I quote the following passage:—

"Arranging below the per-centages of this month (July 1877), in the order of the absolute normal fall

"From these numbers it appears that when the rains directly dependent on the south-west monsoon current are deficient, the failure is most serious in those districts where the normal rain-fall due to this particular current is least, and that the failure does not affect in the same proportion those regions where the rain-fall is heavy. This is what might be expected from theoretical considerations, and the conclusion has an important bearing on any protective measures against the effects of famine that may be in contemplation for the benefit of these districts, for it shows very clearly that those regions which are subject to the greatest per-centage variations of their rain-fall are identical with those in which the rain-fall is normally scanty, and that, comparatively speaking, those in which the normal rain-fall is heavy may be left to take care of themselves, since the per-centage variations of rain-fall in those districts are comparatively small."

The following is a summary of the answers to the latter half of question 1, the districts being taken in their order from north to south.

Kutch.—(Average fall 14.30 inches.) A fall of 10 inches would suffice well distributed, thus—

July	—	—	—	5 inches.
August	—	—	—	1 "
September	—	—	—	4 "

Kathiawar.—(Average fall 24 inches.) A fall of 20 inches is necessary for a good crop. In June 6 inches are required for sowing cotton, millet, til, and inferior grain. Sowing goes on to July 1. In July 5 inches, and in August 4 inches are wanted to develop the crops; in September 4 inches. For sowing the cold weather crops in October a fall of 5 inches is desired. These are wheat and rice. The failure of the July and August rain causes the early crops to wither. Failure of the October rains endangers the wheat and rice.

Kaira.—All depends on the way the rain-fall is distributed. The following falls would give full crops:—

June	—	—	—	5 inches.
July	—	—	—	10 "
August	—	—	—	7 "
September	—	—	—	6 "
October	—	—	—	2 "
Total	—	—	—	30 "

Surat.—No serious damage if the rain-fall is not less than half the average (average 42 inches).

Khandesh.—15 inches of rain falling advantageously, better than 30 inches badly distributed. After the first burst of 4 or 5 inches, a fall of 4 inches per month for four or five months sufficient. A combination of scanty rain and excessive heat produces the worst results.

Nasik.—A fall of 25 inches, if seasonable, is sufficient. Heavy rain coming when not wanted often does harm. Rain is required before sowing in June, after that a few falls at intervals, and good rain in September to enable the crops to ripen. Rabi crops are sown after the October rain, and require showers in December.

CHAP. I. QN. 1.

BOMBAY.

Mr. Chambers.

CHAP. I. QN. 1.

BOMBAY.

Mr. Peile.

Poona.—The early crops are sown after the first fall of rain from the beginning of June to the end of July. A second fall is required in August to mature the crops. Further rain is necessary in September. Showers in October, November, and December are of great benefit to the rabi crops. If the rain falls seasonably, a small quantity only is required, about 15 inches being sufficient, well distributed.

Ahmednagar.—The monsoon season may be divided into the periods (1) from June 10th to August 15th, and (2) from September 1st to October 15th. A fall of 15 inches between June and October would give good crops if the rain fell favourably. This happened in 1873-74 in the Kopergam taluka. A fall of 30 inches would not cause damage. The kharif crop is principally bajra, sown in June or July, reaped in November or December. The rabi crop is wheat, jowari, and gram, sown in September, and reaped in February or March. Near the Western Ghats (Akola taluka) rice and nagli are also grown.

Sholapur.—The crops depend more on the time at which the rain falls than on the quantity. Kharif crops (quarter of the whole) are sown in June or July, as the rain falls; rabi crops in September and October.

Kaladgi.—The Collector says the district is dependent on the monsoon for its rain-fall, and chiefly so on the south-west monsoon. The rain generally falls at intervals between May and October. A little often falls in April, but that is only useful as replenishing the water supply.

The average amount gauged in each of the months when the rain is useful for agriculture is as follows:—

	Inches.	Cents.
May	1	67
June	3	91
July	1	49
August	3	23
September	7	1
October	4	4

The average fall for the year being 22 inches 64 cents. It is difficult to give any limit within which the rain-fall may vary without doing serious injury. The actual amount gauged is scarcely a criterion, because a heavy fall of a few hours may gauge much, but be of little good if it ceases entirely, whereas a gentle but continuous rain, which does not gauge much, may be most beneficial. For instance, the rain-fall in June 1876 (6 inches 83 cents) is the highest recorded in the 10 years, but yet that was the great year of famine. The rain in September 1877 (12 inches 3 cents) did infinite damage from its heaviness, whereas I cannot learn that that of September 1874 (22 inches 6 cents) did. Again, the fall of 1876 (13 inches 40 cents) resulted in severe famine, whereas the fall of 1871 (13 inches 92 cents) did not cause any bad effects. In that latter year the rain may be said to have fallen seasonably though scantily, and I would take the aggregate and monthly fall during it as a criterion of what is sufficient.

I believe from what I hear, and judging from the present year, the rain-fall may almost entirely fail in June and to the middle of July without causing serious injury, provided the rain falls seasonably afterwards.

Up to the middle of August the sowing of the kharif crops is dependent on the rain-fall, and from that time till the end of October the sowing of the rabi crops is so dependent.

If the rain fails, the crops either cannot be sown or get withered up. During 1876 the rain so fell that it was of benefit to neither crop, so that famine resulted.

Satara.—The Collector says the regular rain-fall takes place from about the 20th June till the 30th September. This is the westerly monsoon, on which the greater part of the district depends. It does not as a rule penetrate more than 20 miles east of Satara. The eastern part of the district depends upon storms

at irregular intervals, from the 15th May to the 15th June. Some easterly rain occasionally falls about Christmas and in March or April. I consider that a fall of 32 inches, if favourably distributed, is sufficient for the district, but we cannot well do with less. The variation, therefore, should be between 32 inches and 53 inches. We require rain from May 15th to January. The minimum fall, if favourably distributed, would be—

May	-	-	3 inches.
June	-	-	9 "
July	-	-	5 "
August	-	-	5 "
September	-	-	5 "
October	-	-	4 "
November	-	-	- "
December	-	-	1 "
January	-	-	1 "
Total	-	-	32 "

The May rain is required to prepare the fields and to cause the grass to begin to spring, so as to be ready to receive the westerly monsoon in June. About 5 of the 9 inches in June should fall between the 5th and the 20th of that month, so as to enable the cultivators to complete the preparation of their fields and to sow bajra in the east, early jowari and pulses in the centre, and rice and nachni in the extreme west of the district. The remaining 4 inches will cause the seed to germinate, and the crops to grow. The 5 inches in July should fall about the middle of the month, to enable bajra to be sown in the centre of the district. The rain in August and September is necessary for the proper growth of the crops, and if an inch or two falls at the end of September, with 4 inches at the beginning of October, the rabi crop can be sown, and will flourish, but it needs an inch in December or January, about Christmas or New Year's day, to help it on. If rain does not fall in May or June, the grass crop will probably fail in the centre and west of the district, and rice will probably not be sown. If rain falls early in June, and if there is a long break, the rice and nachni will wither. If rain does not fall in June or July, the kharif crop will not be sown. I give up to the 20th July for sowing kharif. If good rain falls in June and none in July or August, the kharif will be lost. If seasonable rain falls at the end of September and the beginning of October, the rabi crop will thrive. If none falls in September and October, but early in November, the rabi crop will not be so good; if no rain falls in September, October, or November, the rabi crop will fail. The worst results in this district have been produced by the failure of easterly rain, and a scanty fall from the west in June and July.

Dharwar.—Mr. Charles says the normal system of rain-fall in Dharwar may be divided into three periods. The first is from the middle of April till the end of the first week in June. During this period there should be heavy thunderstorms about every 10 or 15 days, with falls of from half to 2 inches, generally from the east. These falls are necessary for the rice fields all along the western side of the district, to enable the rice to be sown before the end of May. East of Hubli these rains are of no particular use, as in the black soil there is no rice, and no crops are sown before the end of June or beginning of July.

The next period is that of the S.W. monsoon, and lasts from the middle of June till the middle or end of September. The monsoon should begin with about a week of heavy rain, that is to say, heavy showers lasting some hours every day, to moisten thoroughly all the land intended for early jowari and nachni. After a week's rain, there should be a week of nearly fair weather, to enable fieldwork to go on, and early sowings of jowari should begin in the beginning of July.

The whole of July should be wet, with but few entirely dry days. August is generally a dry month, in average years the rain-fall being from 2 to 3 inches only. September should be moderately wet, with many fine days.

October is the month that exercises most influence on the harvest, and unfortunately it is also the month which has the most uncertain rain-fall. If there be no rain-fall at all, as was the case in 1876, the cotton, later jowari, and wheat crops are entirely lost, as happened in 1877.

If it be unprecedentedly heavy, as in 1877, the early jowari is injured and the ears sprout, as was seen in November 1877.

The October rain comes entirely from the east, and is not of the nature of steady rain, but comes in sudden and very heavy downpours, lasting an hour or two.

The total rain-fall in October should be about 6 inches, from half an inch to 2 inches falling in one heavy plump every few days. This gives all the moisture necessary for the cotton and wheat and later jowari crops, and after October the less rain that falls the better both for the harvesting of the early jowari crop and for the cotton and wheat and rabi crops generally. But few seasons pass without a few days of rain, often heavy, in December and January, and any excess causes mildew in the wheat. This refers to the east of the district only, as the rice and early jowari are cut in November and the beginning of December, and rain in January matters little in these parts.

Ratnagiri.—The Collector says we are dependent on the south-west monsoon, which comes about the 5th of June, and continues, with breaks, up to 15th October.

The rain-fall is gauged at every one of the 12 Taluka and Mahal head-quarters, and also at the civil hospitals at Ratnagiri, Vingorla, and Dapoli. The average rain-fall in the past 20 years has been as follows:—

	Inches.	Cents.
In June	29	49
" July	32	57
" August	18	2
" September	12	33
" October	2	59

The average fall in the year is 97 inches 62 cents; this would be a fair and sufficient amount. A smart fall for about 10 days is required with the burst of the monsoon, to enable the people to sow their seedling patches of rice and plough up their other lands, ready for soaking before transplantation. A break with light showers for a fortnight would then be serviceable.

In July there should be very heavy rain and storms. In fact there can then hardly be too much rain. During that month the ryot will be first soaking (by swamping) his lands, and will then be occupied in transplanting.

Heavy and steady rain with intervals of sunshine should follow throughout August, when the ryot will be weeding his fields.

Lighter rain and more sun should follow in September. At the end of September a few heavy falls will be seasonable. Early in October the "halway" or early crops on the uplands will be ready to cut.

About the middle of October heavy rain for some days will be seasonable, and conduce greatly to a good "warkas" or hill-crop season.

A late monsoon, therefore, results in a diminished area of cultivation, because the ryot has too short an interval between the first fall and the very heavy rains of July, and in a lighter crop, because the seedlings have not grown sufficiently strong for transplanting when the heavy rains come.

A drought in September and October necessarily results in the drying up and withering of the hill crops.

A combination of a late monsoon, therefore, with drought in September and October, brings ruin to the crops of the Konkan, especially to the hill crops.

Canara.—For rice crops on the coast the rain-fall should not exceed 120 inches or be less than 85 inches. In the latter case the fall should be spread through four months. Above Ghats the fall may be as low as 30 inches. Rice land and the areca nut, cardamom, pepper, and coconut gardens are prepared and sown in May. The monsoon is expected by June 5th. Rice transplanting takes place in June and July. A second crop of rice is sown in December in the moistest lands. A deficiency of rain in June or July defers sowing, in August parches the crops, in September diminishes the out-turn. A total failure in June and July would produce the worst results.

Thana.—When the monsoon begins in June or July, the ground is ploughed and the rice seed sown in nurseries previously prepared with ash manure. A copious fall of rain in July is needed to prepare the fields to have the rice transplanted into them. After this sunshine and light showers for three weeks, and then a good fall is needed to fill the grain. Dry weather is required in October and November, when the crops are cut. Failure of timely rain injures the crop, but no disaster worse than a partial failure from scanty rain is recorded.

Colaba.—Rice is the staple crop. A seasonable rain-fall would be—June, 20 inches; July, 20 inches; August, 30 inches; September, 15 inches; October, 5 inches. Failure of rain when the rice is sown and transplanted is fatal to the crops.

SINDH.

Sindh lies just outside the regular track of the south-west monsoon. Its rain-fall is therefore fluctuating, and as a rule scanty. The average annual fall is about 7 inches. The minimum may be put at 2½ inches; the greatest fall recorded since 1856 has been 28.45 inches. Excluding the rare years in which

the fall is excessive, the average is about 5 inches. (Sindh Gazetteer, from observations of Kurrachee Meteorological Observatory.) The following are the monthly averages as recorded at five principal stations representing northern, central, eastern, and southern Sindh.

Stations.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
Shikarpur	·34	·29	·51	—	·64	·20	·95	2·49	·30	—	—	·13
Schwan	·31	·10	·14	·3	·16	—	1·31	3·30	·87	—	—	·18
Umarkote	·7	·14	—	—	·11	·20	3·97	2·30	·2	—	—	·8
Hyderabad	·30	·29	·12	·5	·1	·57	3·13	1·69	·85	—	·8	·2
Kurrachee	·67	·3	—	—	·01	·30	4·08	·54	·34	—	—	·15
Average for province	·34	·17	·15	·16	·18	·25	2·69	2·6	·47	—	·16	·11

CHAP. I. QN. 1.

SINDH.

Colonel Haig.

2. In regard to its agriculture, Sind may be said to be almost independent of rain, and the scanty average rain-fall above shown would, if rain were more regular, ensure abundant harvests. Unfortunately the fall is very fluctuating. In many years there is hardly any; in some years there is greatly too much. August is the only month in which there is, as a rule, no failure. A perfect rain-fall would be about as follows—

	Inches.
Kharif { June - 2.50 (beginning about 20th).	
July - 2.50	
August - 3.00	
September - 5.00 (not after 10th).	

MADRAS.

The Board of Revenue.

For the purpose of illustrating the system of rain-fall of the Presidency, the year may be conveniently divided into two equal periods, viz., from the 1st October to the 31st March, and from the 1st April to the 30th September, the bulk of the rain-fall in these periods being due to the south-west and north-east monsoon respectively.

2. The south-west monsoon commences to blow in the end of May or beginning of June, and a great portion of the vapour brought with it from the Indian ocean is intercepted and condensed by the Western Ghâts and precipitated in torrents of rain on the strip of land between these mountains and the sea, which forms the district of Malabar and Canara, and the kingdoms of Travancore and Cochin. A portion, however, passes over the range, or through the gaps which here and there occur, and finds its way in more or less abundance to every district in the Presidency. Excluding the minor showers of April, which are not due to the influence of either monsoon, the average rain-fall of the six years ending 1875-76 during the south-west monsoon for each district is noted below.* It will be observed that according to this average the rain-fall is less in Malabar than in Canara, and the returns from the Trevandrum Observatory show that the fall in that State is considerably less than in Malabar. The same phenomenon occurs with what blows over the Western Ghâts, the fall in the Northern Districts of Ganjam and Vizagapatam being almost one fourth of that in Canara, while in the district of Tinnevely to the extreme south of the Presidency the average amount registered is no more than 4.14 inches. Subject to this same rule of a greater fall in the more northerly districts, the amount of rain precipitated to the east of the Western Ghâts seems to vary directly with the distance the vapour has to be carried overland, the fall in the more inland districts being almost invariably less than in the districts nearer the coast in the line of the wind, the only exceptions to both rules being the district of Nellore and, in a much less degree, the

	Inches.
*South Canara	130.80
Malabar	97.07
Ganjam	30.27
Vizagapatam	26.02
Godavari	25.89
Kurnool	23.22
North Arcot	23.23
Salem	21.78
South Arcot	21.08
Kistna	21.08
Chingleput	20.97
Madras	20.76
Cuddapah	19.14
Bellary	17.68
Tanjore	16.00
Trichinopoly	15.14
Nellore	14.19
Coimbatore	11.54
Madura	7.96
Tinnevely	4.14

	Inches.
Rabi { December - 2.20 (beginning about 25th).	
January - 2.60	
February - 2.40 (not after 25th).	

Thus, a rainfall of 7.70 inches, if not fluctuating, is about the best quantity that can be had in aid of irrigation.

3. Failure of rain is more serious in the rabi than in the kharif season. In the latter it results in some deficiency, both in quality and quantity of the crop; but in the rabi the crops grown (especially wheat, the most valuable of all) on land flooded during the inundation are liable to nearly total failure if no rain falls during the cold season.

MADRAS.

adjoining district of Kistna, where the fall is less than in several other districts both further south and further inland.

3. The north-east monsoon blows from the Bay of Bengal, commencing about the middle of October and ending in December. The statement below* shows the average rain-fall in each district between the 1st October and the 31st December. The amount which falls is much less than that during the south-west monsoon, and its distribution seems to be governed by more complex laws.

4. Very little rain falls in the early months of the year, but before the burst of the south-west monsoon there are occasionally a few showers popularly known as "the mango showers," the average quantity of which is as shown below:—

	Inches.
Tinnevely	5.86
Malabar	5.44
Tanjore	4.33
Madura	4.18
Coimbatore	3.20
South Arcot	2.77
Trichinopoly	2.82
Chingleput	2.61
Salem	2.35
South Canara	2.35
Madras	2.22
North Arcot	2.13
Ganjam	1.99
Vizagapatam	1.48
Nellore	1.24
Kistna	1.07
Godavari	1.02
Bellary	0.75
Cuddapah	0.73
Kurnool	0.47

The total average rain-fall in each district ranges thus:—

	Inches.
South Canara	143.60
Malabar	114.95

	Inches.
*Madras	34.98
Chingleput	24.64
Tanjore	23.16
Nellore	21.04
South Arcot	20.92
Trichinopoly	16.98
North Arcot	14.98
Vizagapatam	13.15
Malabar	12.44
Godavari	12.37
Tinnevely	12.85
Ganjam	11.77
Madura	11.59
Salem	11.17
Cuddapah	11.10
South Canara	10.45
Kistna	10.43
Coimbatore	10.07
Bellary	7.34
Kurnool	6.32

RAINFALL.

to each of the monsoons. It must, however, be borne in mind that most of the crops, the cultivation of which is commenced under the south-west monsoon, are matured during the north-east monsoon.

Districts.	From April to September.			From October to March.		
	Dry.	Wet.	Total.	Dry.	Wet.	Total.
Ganjam	90	93	92	10	7	8
Vizagapatam	82	83	83	18	17	17
Godavari	76	96	87	24	4	13
Kistna	51	70	53	49	30	47
Nellore	32	43	36	68	51	64
Cuddapah	57	69	57	43	31	43
Bellary	68	63	67	32	37	33
Kurnool	65	80	65	35	20	35
Chingleput	37	34	35	63	66	65
North Arcot	73	69	72	27	31	28
South Arcot	71	61	68	29	39	32
Tanjore	51	61	59	49	39	41
Trichinopoly	57	62	58	43	38	42
Madura	50	38	48	50	62	52
Tinnevely	9	35	15	91	65	85
Coimbatore	57	60	57	43	40	43
Nilgiris	65	100	65	35	—	35
Salem	81	75	80	19	25	20

It is to be noted that the rain-fall given above is merely the average for a district, and that it not unfrequently happens that the rain-fall in one part of a district varies as widely from that in another part of the same district as it does from that in stations in other districts, if not more so.

The following statement shows the proportion of the Ryotwar area cultivated under each of the monsoons in Fasil 1284, which was a favourable year. The figures, however, cannot be said to be absolutely correct, as the village accountants often enter the cultivation of one month in the month following; but they are sufficiently near the mark to furnish a rough idea of the extent to which the country is indebted

N.B.—In Madras cultivation, is trifling and not recorded, and for Malabar and South Canara monthly cultivation figures are not available.

A statement showing the average rain-fall of six years in each district in each month is annexed:—

STATEMENT OF RAIN-FALL in each DISTRICT and for each MONTH on the AVERAGE of the SIX YEARS from 1870-71 to 1875-76 (inclusive).

Districts.	June.	July.	August.	September.	October.	November.	December.	January.	February.	March.	April.	May.	Total of the whole Period.
	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.	In.
Ganjam	6.25	6.27	6.75	9.09	9.74	1.49	0.54	0.22	0.11	0.30	0.81	1.11	44.03
Vizagapatam	4.60	5.33	5.97	8.01	10.68	1.55	0.92	0.09	0.28	0.34	0.39	2.01	39.28
Godavari	4.08	6.24	4.98	8.58	10.48	1.51	0.38	0.11	0.18	0.34	0.21	1.47	32.58
Kistna	2.99	4.85	5.00	6.77	8.54	1.61	0.28	0.47	0.05	0.34	0.19	1.45	36.47
Nellore	1.43	3.04	3.45	4.82	11.07	7.65	2.32	0.35	0.57	0.19	0.13	1.45	30.97
Cuddapah	2.44	2.99	4.09	7.00	7.97	2.44	0.69	0.13	0.15	0.22	0.23	2.62	25.77
Bellary	2.96	2.69	3.49	5.91	6.41	0.71	0.22	0.06	0.01	0.14	0.54	2.63	30.01
Kurnool	3.29	5.32	4.19	8.37	5.24	0.74	0.34	0.04	0.00	0.14	0.29	2.05	57.96
Madras	3.17	4.58	4.34	6.08	14.34	16.27	4.37	0.10	1.10	0.39	0.63	2.09	48.22
Chingleput	2.72	3.94	5.32	6.17	9.66	12.14	2.84	0.26	1.69	0.21	0.45	2.82	40.34
North Arcot	2.53	3.46	6.27	6.51	8.19	9.62	3.11	0.25	1.35	0.20	0.97	3.35	44.77
South Arcot	1.79	3.16	6.27	6.51	8.19	9.62	3.11	0.25	1.35	0.20	0.97	3.35	43.49
Tanjore	1.88	2.43	4.60	4.34	8.34	6.50	2.14	0.35	0.95	0.10	1.42	2.44	34.94
Trichinopoly	2.01	1.88	4.49	4.32	8.34	6.50	2.14	0.35	0.95	0.10	1.42	2.44	28.73
Madura	1.30	0.86	2.36	1.83	5.12	5.03	1.44	0.56	1.03	0.60	1.99	1.61	22.85
Tinnevely	0.73	0.34	0.71	1.05	3.56	7.42	1.87	1.59	1.53	1.08	1.66	1.31	24.81
Coimbatore	2.07	1.66	2.19	2.69	5.56	3.95	0.56	0.15	0.56	0.52	1.97	2.93	35.30
Salem	2.40	2.70	4.77	6.63	7.22	2.89	1.06	0.07	0.40	0.62	1.26	5.28	143.60
South Canara	38.09	47.57	22.08	14.56	8.55	1.63	0.27	0.82	0.18	0.26	1.09	8.50	114.95
Malabar	35.42	32.17	11.44	8.51	8.49	3.18	0.77	0.56	0.61	0.61	3.66	9.53	114.95

The average given in the statement is taken on the results of the six years ending 1875-76, and is, in the opinion of the Board, a fair approximation to the normal rain-fall so far as there can be said to be any "normal" rain-fall when the variations in the average of a district in six ordinary years are as great as are detailed below:—

District.	Maximum.	Minimum.
	In.	In.
Ganjam	60.44	30.67
Vizagapatam	54.32	26.30
Godavari	47.35	26.91
Kistna	36.63	26.37
Nellore	44.36	28.97

District.	Maximum.	Minimum.
Cuddapah	50.89	21.77
Bellary	39.19	19.63
Chingleput	76.01	29.39
North Arcot	55.93	25.80
South Arcot	63.81	33.42
Tanjore	57.06	30.27
Trichinopoly	29.73	15.61
Madura	27.93	19.33
Tinnevely	27.78	22.77
Coimbatore	42.98	27.71
Salem	183.87	114.42
South Canara	138.41	97.75
Kurnool	49.74	22.97

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The Board have not calculated the average on the results of a larger number of years, as correct figures are not available for years previous to 1870-71 as will be seen hereafter, and 1876-77 was altogether an exceptional year, the like of which, it is to be hoped, may not recur for a very long time.

As the quantity of rainfall required for agricultural operations depends upon various circumstances, such as the kind of crop raised, the nature of the soil and situation, and other considerations, the board requested the Collectors to consult the local experience of agriculturists, and to forward two statements showing for the principal crops in each district, (1) the maximum amount of rain they can bear each month without being injured, and (2) the minimum quantity they require to yield an average crop. The statements received have been tabulated, but it is evident that the information given is not very trustworthy. Many Collectors themselves state that the information furnished by them is not accurate, and in other cases there is abundant internal evidence to the same effect.

There can be no doubt that the experience of ages has taught the ryot to adapt his cultivation to the periods of rain-fall, by so timing his operations that his crop may arrive at particular stages of growth at periods of the year when the rain that is usually expected will benefit instead of injuring it. In those districts in which the mango showers fall with any degree of regularity, cultivation begins as early as April when the season is favourable. The light rains that fall enable the ryots to plough the ground and prepare it for receiving the seed. The seed is sown in the month of May, when moderate showers fall before the regular burst of the south-west monsoon. Where the mango showers cannot be depended upon, and even in other districts when it has been ascertained that the usual mango showers have failed, ploughing and preparing the ground is as late as the end of May or the beginning of June, and seed is sown before the end of the latter month, by which time the south-west monsoon has fairly burst in all the districts. In the tracts irrigated by the river systems fed by the rains of the south-west monsoon, such as the Godavari, the Kistna, and the Cauvery, the sowing takes place a little earlier, as the river freshes supply the required moisture before the south-west rains set in on the east coast. Paddy crop is from four to six months on the ground (one variety even less), and the dry crops generally between three and four months. The first crop of paddy (kar) and the dry crops generally take four months, and are reaped by the end of October before the north-east monsoon sets in. But the most extensively cultivated variety of paddy is samba, which is reaped in six months, and requires the rains of the north-east monsoon to bring it to maturity. After the first crop is reaped, if there is sufficient water, a second is sown and gathered about February or March. On dry lands also a second crop is sometimes raised of cholum, cumbu, ragi, or varagu, if the first harvest is over by October; if later, gram, oil seeds and pulses are sown in December and January, and matured by the moisture left by the north-east monsoon rains and the heavy dew which then falls. On the west coast the cultivation of cereals may be said to be almost confined to the growth of paddy. The first and the most important crop, called yenel in South Canara, and kanni in Malabar, is reaped by September. The second crop is put in in November and reaped in January, and depends upon rivers, channels, and springs, assisted by the north-east rains. If there is sufficient water in the rivers and private tanks, a third crop is put in the ground in February and reaped in May.

It is to be borne in mind that the above is a very general description of cultivation, and that the times of reaping and sowing differ from place to place, according to local peculiarities and the kinds of crops raised. It will be seen that rain is essential at the sowing time, viz., in June and July, for otherwise the cultivation cannot be commenced. If the rain

holds off till August, the cultivation under the south-west monsoon will, perhaps, be given up. If it is undertaken, it may suffer from the heavy rain of the north-east monsoon; and on the other hand, if the north-east monsoon fails, the crop must inevitably perish. Of the wet crops, "samba" paddy begins to ear in 4½ months, and "kar" at the close of the third month. Continued drought at this period will be most injurious, and the injury cannot be repaired by any subsequent rain-fall. The following extract from the report of Mr. Price, the Collector of Chingleput, puts this matter in a clear light:—

"There are two periods which are critical in regard to crops; first, when the flower is about to appear; second, when the ears are filling. An excess of rain or the reverse for a fortnight or three weeks decides what the fate of the crop will be. Subsequent rain-fall or fine weather may mitigate matters, but will not finally remedy them. Thus, as regards the early rice crop, if there is heavy rain at the end of June and into the middle of July, it would do harm; if it went on to the end of July and well into August, it would do still more; but if the rain held off during the latter part of July and it was fine in August, the flower which ought not to have had rain on it in June and July would, to a considerable extent, recover. So if when the ears began to fill towards the middle of July there was a want of rain, which would cause a good deal of the young ears to become chaff, and copious rain came at the end of the month, a good deal of the grain would recover. Generally speaking, it may be said that where there is either heavy rain or want of it for about three weeks beyond the period at which it should usually fall, or the reverse, and then that the season rights itself, no very material damage occurs; but if this time has elapsed, marked and permanent injury is occasioned. In the case of ragi, heavy rain will damage it when coming into ear, and when ripening; fine weather within three weeks in the first instance, and within ten days or a fortnight in the second, will put matters right. In the first instance the ears do not fill; in the second the grain apparently germinates whilst on the stem.

"The cumbu crop is much more delicate than either rice or ragi. If there is heavy rain at the time of its coming into flower, nothing will save the crop. On the other hand, if there is any dry weather near to the time that the first flower shoots should appear, and copious rain comes, the cumbu recovers in a marvellous way. Heavy rain again after the grain has formed causes injury by inducing a kind of spurious germination; fine weather within a fortnight or three weeks will check this, but if there is too much dry weather after the heads are formed, no subsequent falls of rain will recover the crop. It may, however, induce the throwing out of young shoots, and the production of a light crop."

The quantity of rain-fall required for growth, as already stated, depends upon a variety of circumstances, such as soil, temperature, situation of the land, state of the atmosphere, and prevalence of winds, so that any general description must necessarily be no more than a rough approximation. Some crops can stand drought better and longer than others, and the quantity of rain required for certain crops and soils is much greater than that required for others. In slopes the moisture soon drains off, and a heavier rain-fall is necessary for the growth of crops there than elsewhere. Some soils, on the other hand, such as the black cotton soils of Bellary, are very retentive of moisture, and any large amount of rain will do injury. Rice crops can stand almost any amount of rain without being seriously injured, provided the plant is not wholly submerged in water. Varagu is a most hardy crop, can withstand drought long, and revive to a great extent if rain falls before it has actually perished. Gram, gingelly, &c., are very delicate, and will be injured even by comparatively moderate rains. The following remarks of Mr. Martin, the sub-collector of Madura, in regard to the

effect of rain-fall on different crops will be found interesting:

"Paddy.—Excessive rain-fall will not injure this crop throughout its growth, except by breeding insects in, and knocking the grain out of, the ear. Scanty rain-fall will not repair damage under the circumstances. Deficient rain-fall will principally operate by affecting the sources of irrigation, so that field after field is deprived of its water. As it is known that paddy after being totally deprived of moisture for twenty days perishes, those fields only will be revived by copious rain-fall which have not been deprived of their supply for that length of time. The out-turn on fields so revived will vary by the length of time for which the field is dry; if for seven days it will be 40 per cent. below the average; for fourteen days 50 per cent.

"Copious rain after a failure can be remedied with paddy to a certain extent, because a variety of the plant can be sown on the withered fields the moment the tank, &c. receives a supply, and the crop may possibly only be retarded by the length of time that elapsed from the former sowing to withering, and this time may be shortened by choosing a crop that comes to harvest in a shorter time.

"White Cholum.—Excessive rain injures the stalk, turns it in the first month pale, and in later months red or dark brown with the final effect of disease in the ear affecting the size and consequent weight of the grain and its quality. The paleness in the first month will be quite remedied, and the crop restored by a month of scanty rain-fall. The redness in the older stage will be checked in extending, but plants already attacked will not be restored. The ear once having been formed in a deteriorated state will not be improved by scanty rain-fall. Cholum is a hardy crop, and will stand a deal of drought, springing almost as vigorously as ever from the old roots if it gets a copious rain-fall while in its first month. If it once dries up and looks scorched when the stalk is well formed it will give a bad return even though it gets copious rain.

"Varagu, ragi, and samai are very hardy plants, and will get on with very little moisture for nearly two months at first, and thrive luxuriantly afterwards under copious rain. Varagu and ragi stand a great deal of rain well, and are almost independent of a change into a light rain-fall. Samai will thrive under very heavy rain up to near harvest, when heavy rain will be fatal to it on account of the slight hold the grain has on the ear. Samai suffers from deficient rain-fall when it is well advanced.

"Cumbu follows cholum very nearly in its power to resist heavy rain or to be injured by deficiency. It is supposed to be able to do with less moisture, and at the same time to be less affected by excessive rain than cholum.

"Dhal follows very much the same seasons as cholum, but it is less likely to suffer at any part of its growth if subject to scanty rain-fall. If when young it will always retain sufficient life to be made very luxuriant by a copious fall; the effect of deficiency on the advanced plants is both in the number of pods and size of the pulse, and this will not be remedied by copious rain after they have formed. Excessive rain long continued has a tendency to produce animal life to a very destructive extent in this crop, and subsequent scanty rain-fall will not remedy it.

"Horse-gram suffering from deficient rain-fall will rally very much under a copious fall and *vice versa*, provided the creeping tendrils are nipped off and the plants prevented running into leaf."

The following extracts from the replies of the Collectors of Vizagapatam, Kurnool, Coimbatore, Tanjore, South Canara, and Malabar, and the sub-collector of Madura, who appear to have given a good deal of attention to the subject, will be useful as showing generally what amount of rain-fall is considered necessary in the respective districts to secure

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a fair harvest of all the crops grown. The principle underlying these replies is the same throughout, viz., that the times for conducting particular operations have been so fixed that the expected rains may not injure but assist the growth of the crop at its several stages. The remarks of the Collectors of Vizagapatam and Kistna may be considered to be applicable to the whole of the Northern Circars, of Kurnool to the ceded districts, of Coimbatore to Salem, of Tanjore to Trichinopoly, and of South Canara to Malabar. The Collector of Vizagapatam, Mr. Goodrich, says:—

"No two falls of rain are exactly alike in the suddenness of their fall and in the strength of the wind which accompanies them.

"Periods of drought vary in their mischievous effects infinitely according to rain-fall that may have preceded them.

"Paddy requires about 3 inches in June for the seed beds and to begin ploughing. In July or in the beginning of August there is needed a fortnight's rain amounting to 6 or 8 inches if a good plant-out is to be effected. There ought not to be more than 10 dry days consecutively between the 20th June and the 1st September. September needs about 4 inches, and thrice that amount will do no harm. Four inches will not be enough unless previous rains have been copious. October needs 6 or 8 inches, and twice that amount will do no harm.

"Light rain between 15th June and 15th September will do for ragi, provided that not more than 15 days' drought occurs at any time; 20 days nearly ruins the crop, unless there have been very heavy previous rain.

"Cumbu will bear almost any amount of rain without wind. If a gale accompanies rain after the 1st July, mischief is done to all ripar fields in exposed situations.

"Jonna is not grown in this district as much as it deserves to be. On black soil, retentive of moisture, it will do with very little rain, but sandy soil if red will not produce it."

Mr. Crole writes of Kurnool—

"Judging from the registered rain-fall of the last 10 years as compared with the general character of out-turn as stated in annual reports, the amount of rain-fall required for the whole year for a good crop in this district seems to be about 25 inches. If, however, the rains are regularly distributed, about 15 inches would be sufficient as shown below:—

	Inches.
May	2
June	3
July	3
August	4
September	2
October	2

"The popular saying is, and there can be no doubt of its correctness, that one good fall of rain about an inch and a half, in each fortnight after seed is sown, is sufficient for agricultural necessities. But the success of a crop does not seem to depend so much on the quantity of rain which falls as on its proper distribution over the different periods of agricultural operations and at different stages of the crop growth.

"Ploughing.—This operation is conducted at any time of the year, provided there is sufficient moisture in the ground. In a very large number of cases the ryots do this during their leisure hours between reaping and sowing.

"This early preparation of the ground called 'magali' (or seasoning of the earth) is considered by the ryots as peculiarly favourable to the future crop. The general practice, however, is to plough the land in the months of April and May, immediately after the burst of the first rain. Any amount of rain may fall in these months without producing any bad result, neither does the absence of the rain seriously affect, though it may greatly inconvenience, future

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operations. In the beginning of June, however, or about a week before the commencement of the sowing season, a good fall of rain varying from one inch in light to two in clayey soils is absolutely necessary.

"The ryots say that the quantity of rain absolutely required for sowing purposes is as much as would suffice to moisten the ground to a depth of about 6 inches from the surface (or from 1 to 2 inches).

"If the rains are late, say about a fortnight, a shorter quantity of rain moistening a less depth of ground than 6 inches will be accepted as sufficient in the belief that the advancement of the rainy season would compensate for the deficient moisture.

"If the rains fail altogether during the first fortnight of July, yellow jonna cultivation has to be given up, because the sowing of this crop later than July would subject the tender plant to excessive rain in August and September, the chief rainy months, and lessen seriously its chance of getting enough rain in the third month of its growth, when rain is essential to the development of the potta or opened tender ear of corn, so that people never grow yellow jonna in the latter part of July.

"If, however, heavy rains fall in July and August, so as to moisten the ground to the full depth, i.e., as far down as the sub-soil, they prove highly useful for sowing the later jonna in September and October. The bad effect of the early failure would be neutralized by subsequent rains.

"Again, if the rains fall earlier than June, and even if a sufficient depth of ground is moistened, jonna is, as a rule, not sown in the belief that sowing early makes the plant grow too tall and proportionately lessens the size of the ear.

"After the seed is sown cessation of rain for at least three or four days is absolutely necessary. It is more so in black than in red soil. Otherwise the clods of earth firmly stick to the seed and thereby delay and sometimes prevent germination, while all sorts of weeds begin to grow and in a measure choke the seedling.

"About 20 or 30 days after germination the weeding operation is usually performed. The quantity of rain required during the interval is in proportion to the nature of the soil and the extent to which the ground has already been moistened.

"In light soils less rain, say a *padanu* within 15 days after sowing, would be sufficient. In more clayey soils, if the ground had been moistened to the full depth when seed was sown, a slight fall to moisten the plant would be sufficient. Otherwise more rain would be necessary. After a month rain would be absolutely necessary. Any excess of rain or continued fall will conduce to the rapid growth of weeds, and by keeping the land continually muddy prevent weeding, as has been the case in very many instances during the present season, and discolour the plant. If the rains fall at proper intervals, the aggregate quantity in a month, though large, will not affect the growing crop seriously. Hence the aggregate monthly quantity does not afford a good test by which to judge of the favourable or unfavourable result. A fortnightly report will give a more correct means of ascertaining the true state of crops.

"If the rains fail for 15 days in light soils and a month in black soils after sowing, the crop, it is said, will begin to droop.

"Again, if in the second month after the crop is weeded the rains should fail within 15 days, the crops whose vitality has already been weakened by the weeding process would begin to suffer. The lateness in the fall of this rain results in a proportionate decrease in the yield of the crop.

"Weeding operation.—The weeding process is generally gone through twice or thrice, according to the means of the ryot, and according to the quantity of the weeds requiring to be removed, which grow more or less with reference to the nature of the

soil, and the amount of rain that may have fallen. For weeding, cessation of rain indispensable."

Mr. Martin, the sub-collector of Madura, remarks—

"In April there are no dry operations and no crop to be injured by rain except by what is known as Tai-bhogum crop under wells in Pulney Taluk which should be nearly ripe. Any amount of rain in April will be valuable for ploughing the dry land and preparing the wet lands for what is called the Kodai crop.

"In May there are no crops of any extent that can be injured by rain, and the more falls the better, so long as the tanks do not breach, for ploughing in dry lands will continue and sowing of wet lands.

"The highest record in this part of the country was in Fasli 1277, and then there were about 7½ inches without bad results in May. In June there is no general harvest nor general sowing, and the minimum rain-fall required for ploughing is 1 inch; there is no danger from heavy rain-fall. The minimum of July may be a little less than that of June to continue the ploughing and to sow. It is taken at three-quarters of an inch, because in the good year of Fasli 1284 that was the whole amount recorded.

"The maximum for July should be about four inches. More than that will interfere with cultivation by washing away the seed and making the ground too cold. In August the minimum required varies from three-quarters of an inch to two inches, according as the crops are only to be sown or brought on. These crops will bear as much as six inches as the maximum.

"The minimum in September varies from three-quarters to three inches. The maximum recorded in September was last year, and the crops did not suffer by it because it followed great drought; there is no data to show whether they could have stood it after heavy August rain; probably five or six inches would have been as much as would have been good for them considering the absence of sun in this month. In Fasli 1282 they stood with advantage nearly seven inches.

"In October and November the growing plants are strong, and will bear more rain than in August and September. There is also more sun. Three inches is about the minimum they should have in October except certain crops which require more moisture at different periods. Eight inches is about the maximum as the plants get stronger.

"In November the minimum required is about four inches for the majority of crops with similar exceptions.

"In December the crops are ripening and should have only a light equally distributed rainfall, the minimum being one and a half inches and the maximum four inches.

"In January, February, and March no agricultural operations are commenced on dry lands. Harvesting of both dry and wet lands go on in those months, and the only operations commenced are under wells. If these have received a proper supply they can do without rain; therefore, ordinarily, rain is not required at all in January, February, and March. In these months light rain equally distributed will do no harm, but any heavy long continued shower will do so by knocking the grain out of the ear. Two inches of violent rain in either January, February, or March will harm the grain and paddy wherever it falls, but as rain usually falls in local thunder showers, it is impossible to answer this question with reference to the whole harvest of a taluk.

"The tanks, if provided with proper escapes, will stand any amount of rain; and the above remarks have no reference to maximum rainfall for wet land. The wet crops suffer from deficient water in the tanks, and the minimum rain-fall necessary to secure the area usually irrigated at the different times of years has been assumed to be what is wanted."

Mr. E. Forster Webster, the Collector of Tanjore, says:—

"The cultivation of paddy is carried on chiefly under river irrigation. In the month of September, when the rice plants are young and delicate, slight showers are required. In the month of October and November, when the plants of samba, pashanam, or later crop planted in September and reaped in February are about half grown, copious rains are required, followed by light showers in December and January. For the successful cultivation of rice crop regular and ample supply of water in the river is required during five months, viz., from July to November, a slight fresh being sufficient in the months of June and December. For dry crops rain is more or less necessary during eight months of the year, viz., from June to January, copious falls being required in the months of June and July, and also shortly before the harvest in October and November.

"In the case of paddy there should be no rain on the day next to that of planting. Excess of rain can do no harm if there is sufficient drainage for the land, otherwise the young plant will rot.

"After transplantation the plants require no rain for about a fortnight, and if light rains then fall the plants will be strong and healthy.

"Light rains do good to the plants when they are coming into ear, but very heavy rains at this time are likely to prevent the grain from forming properly, and are therefore most disastrous to the crop."

As regards Coimbatore, Mr. A. McCallum Webster remarks:—

"Cholum, ragi, and cumbu are the grains which form the staple food of the people in this district. During the ploughing season a heavy fall of rain of at least one inch is required, and for the subsequent ploughing and sowing another heavy fall necessary. Rain at intervals is most essential to them for about a month after they are sown. Failure of rain after they are sown would be mischievous or ruinous, depending upon the extent of the failure and the length of time it lasted. These crops require to be kept constantly moist for about a month or so after being sown. Failure of rain during that time for a space of 20 days would most probably be mischievous, and could not be remedied by good rain afterwards. When the plants are a little more than a month old, heavy and continuous rain would cause them to turn pale and become stunted, and thus would be mischievous. Again, when they are putting forth the ear (October and November) in ordinary seasons excessive rain would be mischievous. Crops come into ear about three months after sowing, except ragi, which ears in about two months, and to which excessive Coimbatore rain would not do any harm. Again, at harvest time (November and December) excessive rain would be mischievous. When the crops are at the middle of their growth (September and October) good rains are required. Failure then would be mischievous or ruinous, depending upon the extent of failure. It follows, therefore, that it is most important to the ryot to have his crops sown at the proper time, so that they may get good rains when they want them most and when they are most likely to get them. Failure of preliminary rains might thus do a great deal of harm eventually by preventing ploughing, &c., operations which necessarily precede, sowing being carried on at the proper time. The sowing would be late and the plants would get excessive rains when they might not be able to bear them."

Mr. Comyn, Collector of South Canara, writes:—

"The first rice crop being dependent on the falling rain, what is wanted is fairly continuous rain without long breaks. One inch a day for every day of these months would be ample; two inches a day would do no harm; but if 30 inches or more were to fall during any one week in the month, and there were no rain for the remaining three weeks, the crop would perish. A break of even a fortnight would do harm. In August continuous rain is not wanted except for the high-lying lands, from which water soon runs off,

and even then sunshine is an advantage. In September, when the crops are approaching maturity, anything more than the maximum given would do harm; for a fair amount of sunshine is required to ripen the crop, while heavy rain lays the crop already heavy in ear level with the ground, and rots the straw and sometimes the grain. It is impossible to state accurately the maximum amount of rain which may fall without doing injury. Low-lying lands, locally termed 'Pailla,' cannot be cultivated until the water standing on them subsides to a certain extent. The cultivation of these lands is taken up later than that of the ordinary rice lands, and is more liable to be injuriously affected by continuous excessive rain than lands situated on a higher level, which have means of drainage. The character and the position of the lands in the district is so varied, that any accurate general statement showing the maximum or minimum quantity of water that may be required for the growth of the crops cannot be given. The quantity shown as the minimum is that supposed to be necessary to secure an average crop of 12 annas, but agriculturists have a very vague idea of what an inch of rain means.

"The second rice crop is partly dependent upon the rains that fall in these months, but chiefly on water from tanks and streams which are rain-fed.

"The third rice crop does not require rain, but is cultivated with the aid of water obtained from tanks or streams by natural or artificial means. Some kind or other of reservoir or nullai constructed in every land cultivated with the second and third crops. The water supply of course depends on the character of the monsoon. The minimum rain-fall given at the head of this statement, though probably sufficient to bring the first rice crop to maturity, would not suffice to keep in full flow the rivers and channels on which the second and third rice crops depend. A much greater fall would be required for this. The maximum rain-fall in any one of the last 10 years was 181 inches (1874-75), and the minimum 116 (in 1873-74 and 1875-76), when the supply was not sufficient for the second and third rice crops. The average rain-fall of the last 10 years was 137 inches, which is ample for all purposes. The rain-fall should be evenly distributed. Injury by deficient rain-fall in May or June may be remedied by rain in July and August, but should the July rains also be scanty, no subsequent rain will be of any use for this crop. Excessive rain is not likely to prove so injurious as deficient rain. Excessive rain is only to be feared in September or the beginning of October when the first rice crop is ripening and is harvested. Such rain, however, is not without its use; for a prolonged and heavy monsoon is beneficial to the second and third rice crops, not because these crops depend on the falling rain, the case being the reverse, but on account of the plentiful supply of water which such a monsoon secures for the irrigation of the lands on which these crops are raised."

As will have been seen from the preceding remarks, seasonable distribution is of prime importance, and this is further illustrated by the fact that paddy is extensively grown in districts the average rain-fall of which varies from 143·60 to 22·85 inches. Dry crops are also cultivated within the same limits of variation, though not to any great extent; but even where these crops are grown as staples the average rain-fall varies from 48·22 to 22·85. For wet cultivation, however, in all but the West Coast Districts the question is really whether the rain-fall is sufficient to ensure a sufficient supply to the tanks and channels, and provided this is secured the distribution of the rain-fall is not of so much consequence as for dry cultivation, although it is generally considered that the total absence of falling rains or an excess of clear sky during the cultivation season affects the out-turn of crops even where there is sufficient water for irrigation. Garden cultivation may be said to be almost independent of rain-fall unless the drought is so great

CHAP. I. QN. 1. as to dry up the subsoil supply. In Malabar and South Canara, where the rains never entirely fail, crops are not so much injured by drought as by excess of rain; the soil is improved by being exposed to the action of the sun in March and April, and rain in these months is injurious.

The combination of circumstances under which the

worst results are likely to be produced may be said to be unseasonable distribution, combined with deficient rain-fall. It may perhaps be safely said that where the actual rain-fall of any particular year falls below the average by a quantity exceeding 40 per cent. the result must be failure of crop.

MYSORE.

Colonel Hay.

For agricultural purposes the divisions of the rains are considered to consist of three well-defined periods.

First. Those which fall between the beginning of the Hindu year, and the commencement of the south-west monsoon; i.e. from about the end of March to the end of the first week in June.

Second. The south-west monsoon from June to August.

Third. The later rains of September, October, and November.

The first or "Múgar" rains are known also as "Dodda" or "Addamale," that is heavy downpours, resulting from the crossing of currents of air, attended with thunder and lightning, and ordinarily coming from north or north-east.

The south-west monsoon rains are styled "Maddhya" or middle rains, and described as "Sone," that is continuous mild showers or drizzle, with steady south-west wind, unattended with storms, and the last are the "Hingar," or latest rains of the other monsoon. Showers and even heavy falls occur during the winter months, but this is not reckoned as a rainy season.

From this system of rain-fall is derived the principle on which the year is divided into seasons, comprising three periods:—

1. The "Múgar" or early season, including the two first periods of rain.
2. The "Hingar" or late season, including the second or "Hingar" period of rain.
3. The dry season. From the close of the Hingar to the beginning of the Múgar rains.

Each of these seasons has its own distinct crops requiring varied operations, and the crops sown in the "Múgar" or "Hingar" season take their names from the season in which they are sown. In their progress towards maturity, however, they extend into the next period, so that the "Múgar" crop, known also as "Kár," ripens and is cut in the Hingar season, while the "Hingar," styled "Hyne," or principal crop, is harvested in the cold weather.

This last period has also its own cultivation, consisting chiefly of a rice crop, sown in the cold weather, under tanks which have received a supply either from the thunder plumps in the early months of the year, or the later falls of the north-east monsoon in October and November. This may be shown as follows:—

Rains.	Period.	Seasons.	Crop.
Múgar, early "Dodda" or "Adda," "Male" or irregular rains.	From about end of March to end of 1st week in June.	Múgar.	Múgar.
"Sone" or S.W. monsoon, "Maddhya" or middle rains.	From June to August or September.	Hingar.	Hingar.
Hingar late rains, N.E. monsoon.	September to November or part of December.	Do.	Do.

MYSORE.

Rains.	Period.	Seasons.	Crop.
Dry season.	December to March.	Dry season called "Garbha" or pregnant, from the idea that the clouds are gradually forming rain to descend at a future period.	Harvest in following year.

The terms "Múgar" and "Hingar" are, however, usually confined to crops on unirrigated lands, and which are dependent entirely on the monsoon or other rains. The river-fed channel crops, including rice, sugar-cane, and some pulses, are described simply as "Vyshak" and "Kártik," from the months in which they are ripe; and these terms are also applied to the rice crops under tanks which are dependent for their water supply upon the monsoons.

The early rains are the period for sowing Cholum, and the Gid or shot Ragi, as well as oil seeds, and various pulses with good deal of Paddy, and all operations, including sowing, must be got through before the actual arrival of the south-west monsoon; for if the seed is not well above the ground by that time, the season may be said to be lost.

In addition to these cereals, a variety of other products are also sown during the first rains, to be cut during the Hingar period, and these are reckoned to be the following:—

Múgar or early dry crops.

- A. Cereals.
1. Cholum, great millet—*Holcus sorghum*.
 2. Gid ragi—Khar ragi—*Cynosorus Corocanus*.
 3. Sujje—Spiked millet—*Holcus spicatus*.
 4. Navane or Italian millet—*Panicum Italicum*.
 5. Sáme or Sáve—Little millet—*Panicum frumentaceum*.
 6. Baragoo—Little millet—*Panicum Miliaceum*.

- B. Pulses.
1. Ooddoo—Black gram—*Phaseolus minimus*.
 2. Hessaru—Green gram—*Phaseolus mungo*.
 3. Alasandi or Tadagani—*Dolichos catieng*.

- C. Oil seeds.
1. Wollellu or Achellu—Gingelly—*Sessamum orientale*.

The Hingar or Hyne dry crops.

- A. Cereals.
1. Ragi—Ragi—*Cynosorus Corocanus*.
 2. Cholum—Great millet—*Holcus sorghum*.
 3. Harka—Great millet—*Panicum semiverticillatum*.
 4. Sujje—Spiked millet—*Holcus spicatus*.
 5. Same or Save—Little millet—*Panicum frumentaceum*.
 6. Navane—Italian millet—*Panicum Italicum*.
 7. Baragoo—Italian millet—*Panicum Miliaceum*.

RAINFALL.

B. Pulses.

1. Ooddoo—Black gram—*Phaseolus minimus*.
2. Hessaru—Green gram—*Phaseolus mungo*.
3. Togari or Tovari—Pigeon pead hall—*Cajanus Indicus*.
4. Alasandi or Tadagani—*Delichos catieng*.
5. Avare—Cow gram—*Dolichos labal*.
6. Hurali—Horse gram—*Dolichos uniflorus*.

C. Oil seeds.

1. Hoochellu or Prantil—Foolish oil plant—*Guizoteas oleifera*.
2. Wollellu or Achellu, Gingelly—*Sessamum orientale*.
3. Haraloo—Castor oil—*Recinus communis*.

The dry crops given in the cold weather are.

I. Cereals,—nil.

II. Pulses.

1. Kadale—Bengal gram—*Cicer arietinum*.

III. Oil seeds,—nil.

Special produce.

1. Sugar-cane.
2. Tobacco.
3. Cotton.

Miscellaneous produce.

1. Chillies.
2. Coriander seed.

The Hindoo agricultural year is reckoned from March to March, or from the date on which the sun enters Pisces to that on which he leaves Aquarius. The three main periods, namely, two rainy seasons of Múgar (early) and Hingar (late) and one Garbha (dry weather) are divided into 27 parts of 13½ days each, distinguished by the names of the principal stars of the asterisms in which the moon is set down in the calendar as entering and remaining, and in accordance with this division the rains are supposed to be distributed in corresponding periods, the division being continued throughout the dry season, though rain may not fall at that time.

The dates and duration of these for 1877 are given below, as well as the agricultural operations usually carried on at this time.

The three main periods or seasons.	No.	Names of the Stars from which the rains receive their names.	Principal Star of Asterism.	No. of days or duration of each Star.	English Months and Dates.	The Twelve Signs of the Zodiac.
	1	Ootrabhadrapati	A Andromedæ	13½	15th to 28th March	Pisces.
	2	Revati	S Piscium	13½	29th March to 10th April	
	3	Aswini	B Arietis	13½	11th to 24th April	Aries.
	4	Bharani	35 Arietis	13½	25th April to 7th May	
	5	Krittika	21 Tauri aleyonis	13½	8th May to 21st May	Taurus.
	6	Rohini	A Tauri aldebaran	13½	22nd May to 4th June	
	7	Mrugasira	Orionis	13½	5th to 18th June	
	8	Aridra	A Orionis	13½	19th June to 2nd July	Gemini.
	9	Punarvasu	B Geminorum pollux	13½	3rd to 16th July	
	10	Pooshya	Caneri	13½	17th to 30th July	Cancer.
	11	Aslesha	E Hydræ	13½	31st July to 13th August	
	12	Makha	A Leonis Regulus	13½	14th to 27th August	Leo.
	13	Poobha	Leonis	13½	28th August to 10th September.	
	14	Oottra	B Leonis	13½	11th to 24th September	Virgo.
	15	Husta	Corvi	13½	25th September to 7th October.	
	16	Chittah	A Virginis spica	13½	8th to 21st October	Libra.
	17	Swati	A Bootis Arctur	13½	22nd October to 3rd November.	
	18	Vishakha	V Libra	13½	4th to 16th November	Scorpio.
	19	Anoradha	Scorpionis	13½	17th to 29th November	
	20	Jeshita	A Scorpionis autares	13½	30th to 13th December	
	21	Mula	Scorpionis	13½	14th to 26th December	
	22	Purvashada	Sagittari	13½	27th December to 9th January.	Sagittarius.
	23	Oottrashada	6 Sagittari	13½	10th to 23rd January	
	24	Shravana	A Aquinla attair	13½	24th January to 6th February.	Capricornus.
	25	Dhanishta	B Delphini	13½	7th to 19th February	
	26	Shatebhisha	Aquari	13½	20th February to 2nd March.	Aquarius.
	27	Purvabhadrapati	A Pegasi	13½	3rd to 14th March	

The time occupied by the preliminary operations connected with the Múgar crop,* its sowing, maturing, and harvesting, may be taken as extending from the latter end of March till near the close of August or middle of September, and the heavy falls required to ensure a good crop are known as "Hadas," or saturations of the soil to the depth of about a span, which is estimated by those who have compared it with the rain-gauge as equal approximately to one inch of rain.

It is very difficult to obtain information which can be relied on regarding the precise amount of rain

required to ensure a good crop, and still more to determine how the fall can best be distributed or the extent to which either the quantity or the times can be varied without serious injury to the crop.

The total quantity shown as having fallen in any month is no certain test, as a small quantity falling in timely showers is often better than heavy downpours with long intervals between them.

The rain required varies with soil and locality. Different crops also prosper with greater or less quantities of rain; but a rough estimate of a favourable season gives for the Múgar or early dry crops about 20 inches for cereals, 17 or 18 for pulses and oil seeds between March and August.

* Rain Múgar Crop.

CHAP. I. QN. 1. The average for these months of the seven years 1872-78 is:—

Mysore.	Inches.	Cents.
Mysore	13	88
Colonel Hay.	16	80

The average of the same months for 12 years 1865 to 1876 is:—

Mysore.	Inches.	Cents.
Mysore	16	26

according to the Register at Mysore Jail.

Hassan - 18 89 According to the Register at the Civil Hospital at Hassan.

The same rough estimate gives 30 inches as needed for the "Hingar" or late dry crops between April and November, while the average of 12 years for the period is:—

Inches.	Cents.
26	30
30	32

at Mysore.
at Hassan.

RAJPUTANA.

Dr. Moore.

The rain-fall is principally from the south-west monsoon, which, however, passing over the sands of Guzerat, loses much of its force before arriving over Rajputana, until, in the semi-desert district of Marwar, Jeysulmeer, and Bickancer, the fall does not exceed 5 or 6 inches per annum. The more easterly districts to the east of the Aravelli mountains obtain also, during the earlier part of the monsoon, rain from the north-east, being the last gift of the clouds from the Bay of Bengal and the valley of the Ganges, which, instead of passing to the east, are deflected by the Himalaya mountains in a westerly direction, curving towards Central India, and even reaching the western districts of Rajputana. Roughly speaking, it may be stated that the rain-fall of Rajputana is determined by the Aravelli range of mountains, which, culminating to their highest altitude in the extreme south at Mount Aboo, run in a north-easterly direction almost through the centre of the province, being distinct as a wall for some 150 miles to Ajmere, and then continuing in a more broken manner as far as Delhi. To the west of the range the country is sandy, and the fall averages from 20 to 30 inches at the base of the hills; but, decreasing until in the far west at Jeysulmeer and Bickancer, the fall does not exceed 5 or 6 inches, becoming almost *nil* in the extreme west, which may be regarded as the southern verge of the rainless tract stretching through from Central Asia to Northern Africa. To the east of the Aravelli range the rain-fall averages 30 inches, increasing as easterly progress is made, until the more copious rain-fall of the Central Provinces and of Central India is realised.

The rainy season commences about the beginning of July, accompanied on the east side of the Aravelli range by thunder-storms from the east, if the eastern monsoon (from the Bay of Bengal) is in force. August is the wettest month everywhere, September being often dry, but sometimes showery. There are also showers about Christmas from the north.

Captain Barr.

Marwar and Jeysulmere.—The rain comes from the south-west and north-east, but the force of both monsoons appears to be exhausted before it reaches the semi-desert tracts of Marwar and Jeysulmere, for the average rain-fall is very small, and decreases from the south and south-west portions of the district to a minimum of 3 or 4 inches only in the north, north-west, and north-east.

The chief supply of rain comes from the south-west, and July, August, and the beginning of September is the period during which rain is expected. At Jodhpore, which may be taken as the centre of Marwar, the rain-fall gauged during the last seven years is as follows:—

	Inches.
1872	22.45
1873	11.00
1874	6.38
1875	13.92
1876	25.9
1877	4.5
1878	19.5

RAJPUTANA.

The rain-fall in Rajputana cannot vary much as regards diminution, without grave injury to the cultivation, and without causing a scarcity in the supply of grass, necessary for the enormous herds of cattle and flocks of sheep, forming the principal wealth of the province. It is scarcely possible for it to increase more than is acceptable, provided it does not fall at unseasonable periods. Too much rain, excepting perhaps in the extreme eastern districts, has scarcely fallen within the memory of man. Local storms may have sometimes flooded towns, or caused the downfall of some wretchedly constructed houses. But such falls have been emphatically local, the whole country never being deluged to the extent occurring in other provinces, where crops have been destroyed from such causes.

The amount of rain-fall for the whole year, which may be considered sufficient for agricultural purposes, is not less to the east of the Aravelli range than 30 inches. Here the soil is comparatively heavy, in some localities quite black, the country hilly, and much of the water is drained off by the Bunnass, the Chumbul, the Nej, and other smaller rivers piercing the country. To the west of the Aravelli range the country is sandy, the rain falling is absorbed and remains in the soil, and there are no draining rivers, the solitary exception being the Loonee, which, however, only passes through a small part of the country, the south of Marwar. Here, then, the smaller rain-fall of 12 inches suffices for the wants of the cultivators.

To furnish the best results, the rain-fall should be distributed throughout the wet months to the west of the Aravelli—3 inches in July, 8 inches in August, 2 in September, and 1 at Christmas. To the east of the Aravelli—6 inches in July, 18 in August, 4 in September, and 2 at Christmas. This is of course approximate.

Giving an average rain-fall of 14.78 inches. No register is kept of monthly falls, and, with the exception of that at Jodhpore, no rain gauge is maintained in any portion of the district. Generally speaking, a fall of 6 inches is sufficient, when well distributed, to produce an average out-turn of crops; anything less than this produces a failure both of food grains and of grass, upon which the wealth of the district mainly depends. To secure favourable harvests the rain-fall should be about 15 inches, and should be distributed as follows:—July 4 inches, August 5 inches, September 4 inches, December 2 inches.

The kharif crops of bajra, jowar, moth, moong, and maize are sown after the first fall of rain, the land being broken up after the early showers, which usually herald the approach of the south-west monsoon.

The sowings are generally completed early in July; rain is required during the month for the first spring of the crop, and later to promote its growth; the fall in August and September should be sufficient to keep the crops to their full strength during the process of growth and ripening.

The latter rains, *i.e.* the last falls of either the north-east or south-west monsoon, have a double use in completing the success of the rain crops, and in moistening the soil preparatory to the rabi sowings, which generally commence in October, and are completed by the end of November. A fall of 2 inches in the end of December or the beginning of January is most beneficial to the rabi crops, which are then in the blade. An element which is worthy of notice, though frequently overlooked in the examination of registers of rain-fall, is the general condition of the weather during the months in which rain is expected. In some seasons the return of rain-fall is swelled by some unusually heavy falls at intervals during the monsoon months, the weather between these falls being marked by excessive heat, the sun being but little obscured,

and the air dry. In other seasons, though the registered rain-fall was small, it has been well distributed, and the period between the falls has been marked by cool weather, a cloudy sky, and an air laden with moisture.

A failure of early fall in July is not disastrous in this district. Sowings are deferred, but with a good harvest the year before, the accumulations of food grains and grass are sufficient for present wants. It is only when the months of July and August pass without rain that hopes of the kharif fade. Should the drought continue throughout September, or the rain-fall be insufficient for the growth even of grass, the worst combination of circumstances may be said to have arrived, and a "tirkal" or a famine of water, grass, and grain falls upon the country.

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RAJPUTANA.

Captain Barr.

CENTRAL INDIA.

Agency.	Station.	1868.	1869.	1870.	1871.	1872.	1873.	1874.	1875.	1876.	1877.	Average.
Bhopal	Agency Hospital	In. 27.6	In. 41.0	In. 61.6	In. 84.9	In. 36.4	In. 45.8	In. 65.7	In. 55.9	In. 60.3	In. 32.5	In. 51.1
Baghelkhand	Rewah	—	—	—	—	56.4	53.5	66.7	83.5	84.2	36.4	63.4
	Sutna	—	—	—	—	43.3	45.1	41.6	60.5	41.5	31.3	44.0
	Nagode	—	—	—	—	47.0	55.2	52.2	85.4	58.6	40.4	56.4
Western Malwa	Agar	30.1	28.5	30.5	—	41.1	38.6	45.7	51.1	42.7	16.8	36.1
Deputy Bheel Agency	Manpur Dispensary	26.5	36.5	37.7	47.7	37.9	40.4	35.3	42.5	33.7	28.9	36.7

In the Bhopal and W. Malwa Agencies the rains are described as generally setting in from the east and north-east, though occasionally from the south-west.

The Baghelkhand and Deputy Bheel Agencies (Mánpur), on the other hand, state the monsoon is mainly from the south-west, though supplemented from the north-east. As the meeting of the north-east and south-west currents is believed to occur hereabouts, the Baghelkhand Agency have taken some pains to record the wind direction with the rain-fall, with the following result:—

	From East.	From West.	Per-centage from East.
At Rewah	19.29	41.09	31.9
At Sutna	6.19	35.84	14.7
At Nagode	10.33	43.70	18.0

The rains begin in the middle of June and cease about the end of September or beginning of October. July is usually the wettest month. Lieutenant-Colonel Bannerman (Baghelkhand) says one-third of the annual fall occurs in July.

Agency.	Limits within which rain-fall may safely vary.	Distribution.				Remarks.
		June.	July.	August.	Sept.	
Bhopal	45 to 70	2	22	13	5	Actual fall of 1878; this may be taken as typical.
Baghelkhand	23 to 60	1½	5½	10	7	A minimum fall of 26 inches, and includes 1 to 2 in., December-January.
W. Malwa	32 to 40	8	6	12	6	A sufficient fall.
Rutlam	—	5.5	12.5	12.0	8.2	Average monthly fall registered since 1868.
Manpur	—	6	11½	8½	8½	Monthly average for six years.

In W. Malwa in 1877 the fall only amounted to 12.21 inches from June to October, and yet the Indian corn was good and the joar unusually abundant, but the rabi suffered much.

In Central India the kharif is sown about June, and the rabi in October—November. Generally a heavier rain-fall injures the kharif and benefits the rabi. The winter rain appears to be very irregular, but benefits

the wheat, gram, and opium, and is indispensable after an insufficient or scanty monsoon. In Baghelkhand, from 1½ to 2½ inches fall in December—January. In Rutlam, Mir Shahamat Ali, C.S.I., says the rain between 15th July and 15th August produces insects in the crops if not washed away by continued showers in the latter fortnight of August.

HYDERABAD.

What are the different agricultural operations depending on the due arrival of each of the expected monsoons, or seasonal rains? In answering this question we shall deal with Telingana and Marahatwari separately. The account given for the Telingana

province is the result of inquiries conducted by the talukdars, while that for Marahatwari is taken from a book entitled "Notes on the Agriculturists of the Aurangabad District," by Mr. Fardunji Jamshedji.

HYDERABAD.

Moulvie Mahdi Ali.

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HYDERABAD.

Moulvie Mahdi Ali.

Telingana.

Rohini (May 23rd to June 5th).—Rain sometimes falls during this naxtra,* which is not included in the category of the monsoon naxtras. The lands are first cleared of stones and scrub, and then ploughed for the kharif sowings. Sheep are folded on lands prepared for the abi rice crop. Thorns, &c. are collected for forming the field hedges. Agricultural implements, such as ploughs, harrows, &c., are mended, and the Bhagelas (a tribe) engaged as servants and labourers. The last harvesting of the tabi† rice takes place during this season.

Mirg (June 6th to 19th).—Ploughing mostly takes place on kharif lands, which are afterwards sown. Sawan, barag, kudru, kangni, maize, gingelly, urd, mung, lobha, and so forth, are sown during this month.

Ardra (June 20th to July 3rd).—Ploughing operations are still continued. Yellow jowar, hemp, cotton, and bajra are sown during this month. In garden lands vegetables are sown. Lands sown in *Mirg* are now worked with a bullock hoe. Irrigation beds are formed in lands prepared for the abi paddy crops. These are filled with water, and then the ground is ploughed thrice. It is subsequently worked with a harrow. Frequently vegetable matter is mixed with the slush formed on the surface of the fields, and allowed to rot there. The land is now re-ploughed, and is prepared to receive the seed. The seed, after being previously soaked in water for about three days, is sown broadcast. Fields are hedged in.

Punarvasu (July 4th to 17th).—Ploughing and sowing operations are carried on in the same way as that described above. Sowings of the abi paddy are general. Fields under kharif crops are weeded.

Pushya and Ashlesha (July 18th to August 14th).—Operations similar to those described above are conducted, excepting that not much ploughing is done during this naxtra. Transplantation of the paddy plants takes place in most of the fields; in others the crops are thinned, and weeded by hand. Fields under cotton are also weeded. Lands for the rabi are levelled with the bakhar.

Magha (August 15th to 28th).—This is the latest season for abi rice sowings. Tobacco is sown in nursery beds. The abi paddy crops are weeded, and transplantation takes place. Frequently the top shoots of the paddy plants are nipped off.

Purva (August 29th to September 10th).—Of the kharif crops, mung is ready for harvest. The other operations are similar to those mentioned in the last two naxtras.

Uttara (September 11th to 24th).—The last weeding of the abi rice crops takes place. The tops of the plants are nipped off. Mung, urd, yellow joar, kangni, kudru, and such crops are cut.

Hast (September 25th to October 8th).—Rabi crops, such as white joar, gram, linseed, barley, lakh, peas, safflower seed, &c., are sown; garden crops are also sown about this season, and the lands are manured. Bajra and yellow joar and the remaining kharif crops are now cut. The first cotton pickings take place. Tobacco seedlings are transplanted. Land for *tabi* crops is prepared, irrigation beds are formed, and the ground is watered.

Chitra (October 9th to 21st).—The cultivators begin to cut and harvest the kharif crops. The gingelly crop is cut, bound up in bundles, three or four of them being placed in an upright position, resting one against the other, to prevent the seed dropping out. White joar, gram, safflower seed, linseed, and other rabi crops are sown. Besides the kharif and rabi crops, there is a third seasonal crop grown, which is termed *maghi*.

The *maghi* crops are grown about two or three weeks after the rabi sowings are finished, and these

* A naxtra or nakshatra is a division of time equal to 13½ days. There are 27 such in the year.

† Tabi rice is sown in December or January, and cut in May or June. Abi rice is sown in June or July, and cut in November.

crops are raised on poor soils. Hollow ground is generally selected for this purpose, as it retains rain water. Lands for the mung crops are ploughed about this season.

Barley is sown in garden lands. The abi paddy is watered, and the crops watched. In some places this crop is harvested.

Swati (October 22nd to November 3rd).—The kharif crops, such as bajra, yellow joar, &c., are threshed and winnowed. The abi rice is harvested. Land is prepared for sugar-cane; manure, &c. being applied. The last rabi sowings take place during this season. Land for the *maghi* crop is reploughed, and karela, kulthi, &c. are sown.

Vishakha (November 4th to 17th).—The rabi crops are weeded by means of a bullock hoe. The *maghi* crop sowings are finished during this season. The abi rice is harvested, and the straw is stacked. Sugar-cane is planted. Kolus (sugar-cane mills) are fixed and the juice expressed and prepared for *gur*. Land for the rabi rice crop is prepared with manure, and irrigation beds formed.

Marahatwari.

Jeshth (June).—The cultivator is diligently employed in levelling his lands with the bakhar or hoe-plough. If the rains have been favourable and the ground well saturated, kharif sowings take place. Cotton, hemp, til, mung, and tūr are sown through a bamboo seed-drill. Garden lands are prepared and manured for the sowings of ground-nut. Seedlings of red pepper, which have been raised previously in nursery beds, are now transplanted to garden land. Tobacco seed is also sown in nursery beds during this month. Sugar-cane fields are weeded by women, and other lands manured and prepared for planting the cane. The cane is watered about six times during this month. Guwari (*dolichos fabaceiformis*), bheni (*hibiscus esculentus*), chaoli, and other vegetable seeds are sown. Varieties of gourd are also sown. The women assist the cultivator in collecting the scrub, weeds, &c., that are uprooted by the bakhar, and this they sometimes use as fuel.

Ashad (July).—This is one of the few exceedingly busy months for the kumbi. Such lands as have not been sown during the preceding months are now worked again with the bakhar. All the cultivators are busy with this uncouth-looking, but very effective implement, wherewith both kharif and rabi lands are now levelled. The rest of the kharif sowings take place now, and are completed during the month. Bajri, maize, tūr, urd, kulthi, hemp, rālā, &c. are sown. In garden lands ground-nut is sown, and seedlings of egg-plant and red pepper are transplanted. Khonde joar (a coarse grain) is in this month ready for the sickle: this species of joar is only raised in garden lands, and is chiefly used for home consumption. Kaddol, which is raised for fodder, is also cut during this month, and the working bullocks fed on it: it is a rich fodder for cattle. About four waterings are given in this month to the sugar-cane.

Shravan (August).—Such lands for rabi as have not been ploughed for some years are now harrowed, and then levelled with the bakhar. Fields under cotton, bajra, mung, &c. are hoed, and afterwards weeded by hand. Tobacco seedlings are transplanted from the nursery bed to the dry-crop field. Karela, a species of oil seed, is sown. Garden lands, in which ground-nut has been sown, are now weeded. The earth round the sugar-cane plant is dug, and heaped up over the roots, to strengthen the cane. Red pepper (*mirch*) is now ready and plucked from the plants.

Bhadrapad (September).—Lands prepared for the rabi are levelled with the bakhar; joar, linseed, and kulthi are sown. The mung crop is harvested now

* Rohini and Mirg.
† Ardra and Punarvasu.
‡ Pushya and Ashlesha.
§ Magha and Purva.

(the pods being plucked from the plants), and by the end of the month some part of it is ready for the market. The ears of the bajra crop are just forming and have to be protected from birds, &c. In garden lands joar is now sown. Vegetables and edible herbs are ready for the market. The earth round the sugar-cane is again dug out, and heaped up over the roots. Fields under tobacco and cotton are weeded, and also some of the garden lands. The hemp crop is ready now; the plants are uprooted and tied in bundles, to be placed in water, for the non-fibrous part to be rotted away. Fields under cotton are weeded, and in this work women are employed.

Ashvin (October).—If the rains have not been very heavy, the rabi sowings are completed; otherwise they generally take place during the following month. Wheat and gram are now sown; the joar sowings are finished. In garden lands wheat and joar are

* Uttara and Hasta.

beginning to be sown. Urd and mung are threshed, and the women are employed on this work. Grain is forming in the bajra ears, and the crop has to be watched; very often the cultivator has to sleep in his field. Where joar and vegetables have been raised in garden lands they are weeded now, and so are the fields under cotton. In garden lands wheat, gram, &c. are sown, and more of the mirch (red pepper) plucked from the plants. Vegetables are cut and sold in large quantities during this month.

Kartick (November).—The bajra crop is now ready for the sickle, and both men and women are busily employed in gathering the harvest. At night the cultivators remain in the fields to watch the kharif crops. The first cotton is now picked, and here again women are employed. In garden lands buckwheat, gram, opium, rajura, mustard, &c. are sown.

* Chitra, Swanti, and Vishakha.

CHAPTER I.—QUESTION 3.

Give any statistics you possess as to the average area in each district under cultivation yearly, distinguishing food crops from others; the average amount of the chief food grains produced per acre; the total consumption in the district of such grains; the surplus that remains for export, or the deficiency that has to be supplied by import in ordinary years. How are these statistics collected, what amount of reliance may be placed on them, and what suggestions can you make for their improvement? If you have no statistics on these subjects, give any approximation or estimate you can.

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Statistics and their accuracy.—The statistics of cultivated areas published in the reports of each year are based on a very complete system of survey and registration. All the districts of the Punjab (a portion of the Kohat District alone excepted) have come under regular settlement, and the great majority of them have also been surveyed by the Revenue Survey. In the latter case the total area of the district is ascertained by scientific surveyors working with the most accurate methods known to science; and the cultivated area, as it exists at the time of survey, is also ascertained by the same agency, though by less exact methods. At the regular settlement of a district a less expensive method of survey is employed, with results which experience has shown to be, under proper supervision, scarcely less accurate (indeed as regards the exact area of cultivation, for reasons which I need not here explain, they are usually more accurate) than the returns of the scientific survey.

The object of a regular settlement is first to assess the land revenue, and secondly to provide a correct record of the land of which it is assessed and of the persons who have rights of ownership or occupancy therein. Many ends of the first importance are served by such a record; but the primary reason for its formation was the great difficulty of assessing and collecting the revenue without it.

The record is made up by villages, or rather by mauzas, of which perhaps the best translation is the word township. Each mauza, or (if they are small) each cluster of mauzas has an accountant, locally known as the Patwari, whose office is kept as far as possible hereditary, and whose business it is to report as they occur all successions and mutations which take place among the owners and tenants of his charge with a view to the record of holdings being kept up to date, and annually in October to inspect every field, noting the crops grown on it, and such mutations of ownership and occupancy as he may not already have reported. Immediately after this inspection he furnishes a statement showing the total cultivation of his charge for the kharif just reaped and the rabi just sown.

It will be seen that this system is built up upon a reliable foundation. The total cultivated area of each

mauza is ascertained at or before settlement, both by the Revenue Survey and by the settlement officers. The record of rights prepared for each village shows also the area of each field, cultivated or waste. Thus far we may be sure that errors are eliminated. The Patwari's reports each year cannot of course be so closely checked. But there is no reason to suppose that in the majority of instances they contain any very gross errors of area and classifications.

During the past 15 years great improvement has taken place in the returns of the 21 districts that have been under settlement. It is acknowledged that there is still room for improvement. But these remarks are written in order to show that there are good grounds for accepting as fairly accurate the crop areas published in the annual reports. They are not guesses. They are originally based on surveys admittedly accurate, and differ from those surveys only to the extent of the annual expansion or contraction of cultivation and variation of crops; the facts of which are ascertained annually in October by the village accountants.

Thus far as regards statistics of area and of crops cultivated. In regard to statistics of yield our position is much weaker. It may be said with truth that the very great majority of our statistics of yield are guesses. The difficulties surrounding this question even in an advanced European country are very great, and in India they are exaggerated many fold. The agriculturists keep no record of what their crops produce, and the replies of even the most intelligent and straightforward among them need to be very carefully weighed. The Financial Commissioner has found that the returns of yield of each crop reported from year to year by each district officer are not usually, in strict language, estimates of the yield for the year under report; they are approximations arrived at by the reporting officer by the use of the data of old experiments. These experiments are either those made when the district was under settlement, or others made independently by orders of the Financial Commissioner during the years 1872-75. As regards the settlement experiments Mr. Ouseley observes that their value for the purpose to which they are applied is open to question. The officers who

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made them commonly mistrust the results; in practice they never assess up to the standard indicated by their produce estimates, and not uncommonly arbitrarily modify or frankly reject them. Also the small areas, usually small fractions of an acre, subjected to actual experiment, together with the limited periods over which the observations extend, greatly reduce their value as bases for generalisation. Concerning the value of the other set of experiments, those made by the order of the Financial Commissioner during the years 1872-75, Mr. Ouseley directs me to quote the remarks on the subject made by his predecessor, in forwarding them to Government for submission to the International Statistical Congress.

"As the experiments, the results of which have now been embodied, extend over a considerable period and number several thousands, the results may be considered to be fairly general in their nature. With regard to their accuracy it is necessary to remark that the facilities for supervision of such returns are limited, and that only of late have attempts been made to procure such statistics upon an extensive scale, and the subject is one which requires considerable experience on the part of those who make the observations, and a careful exclusion of all unreliable data, to an extent which the returns now furnished can hardly claim."

The last sentence expresses one of the greatest difficulties involved in the subject. And Mr. Ouseley considers that the improvement of our annual estimates of yield depends largely on our recognising this, and on the patient training of those on whom we depend for our observations.

At the same time, taking such estimates of yield as we possess for what they are worth, a table is appended showing the average produce of the principal staples of agriculture per acre, as reported by district officers for the five years ending 1876-77; and as ascertained by the Financial Commissioner's experiments during the years 1872 to 1875.

Suggestions for the improvement of existing statistics.—The Financial Commissioner considers that improvements of two kinds are possible. First, in observing actual out-turn; secondly, in the form and system of the general statistics. On the first point he considers that district officers should be urged to make independent and systematic observations. If we could succeed in observing in each district for 10 or 15 successive years the average out-turn of say 500 acres of land, selected as representing fairly the average fertility of the district; noting at the same time all the contingencies connected with its cultivation, such as expenses, losses, &c., a basis of much value would be obtained, from which to calculate the average rate of production, and the limits within which it varies. With the large revenue establishments at the disposal of Government such observations would be practicable; secondly, as to the form and system of the general statistics now annually reported, the Financial Commissioner considers them capable of material improvement in the following ways. At present the crop area of each year is ascertained by an inspection which takes place just after the kharif has been harvested, and while the rabi is being sown; and the rabi yield is assumed as if all the field sown with the rabi came to maturity. This is a fertile source of error; many fields of wheat and barley are cut for fodder, or the seed fails to germinate; the gram crop constantly fails to a material extent; and for these and other reasons the area harvested never agrees with the area sown. Mr. Ouseley would oblige the Patwāris to inspect and record the area of each harvest at the reaping season, *i.e.*, in October for the kharif and in April for the rabi. In the next place, the returns required from each district should be more carefully adapted to the circumstances of its agriculture. At present one uniform set of statements is required from each district, which give: 1st, a bare statement of the total acreage of each crop; 2ndly, a statement of the average yield of each crop per acre, and 3rdly, the maximum and minimum rate

of rent paid by each crop. It is only in respect of the third subject that any distinction is drawn between irrigated and unirrigated land. The returns do not provide for the separate exhibition of the irrigated and unirrigated areas, and of their respective rates of yield. Only the main crops are shown, and the agriculture is very imperfectly classified. The extent to which manure is used, and its effect on the yield, is also entirely omitted.

The omission of these details from the returns gives them an appearance of simplicity which is fallacious. The simplicity has been obtained by the excision of the most important details;—details without which they can neither be accurately compiled nor command the confidence of those who use them. It is of little use to state that wheat yields 800 lbs. per acre in one district and 600 lbs. in another, unless the proportion of crop which is irrigated in each can be stated. Situated as we are, the most important point of all is to know for each year how much of each food crop is irrigated, and how much is dependent on rain only. It is with no little difficulty and incompleteness, that an answer on this subject (see reply to question 4) could be framed, even after calling for special returns from district officers.

The Financial Commissioner does not think that the demanding of such details from district officers would necessitate the employment of more costly agency than we already possess in the village accountants and revenue establishments of the province; though it would involve an increase in special agency and the cost of supervision. Elaborate statistics are neither desirable, nor practicable; but if the returns required from each district are properly adjusted to the main features of its agriculture, it will be as easy, perhaps easier, to furnish them than the cruder returns now submitted. In brief, the annual returns required from district officers should be revised, so as to show:—

(1.) The total areas under each crop more correctly than is now done.

(2.) The area of each crop which is irrigated, aided by river floods, or solely dependent on rain; and, so far as practicable, the area manured.

(3.) The average yield of each crop under these several circumstances.

And a reasonable amount of variation should be allowed in the returns of each district; so that no one should be required to fill up tables unsuited to the agriculture which they are intended to describe, or which neglect important local specialities.

In conclusion, Mr. Ouseley would urge on the Government the creation of an appointment in the Punjab similar to that held by Mr. Buck as director of agriculture in the North-West Provinces. If the attention which Government desires its district officers to give to agriculture and its statistics is to be intelligently directed, and to achieve any results, this can only be by providing at least one officer in each province, who can give his sole attention to the supervision of the subject.

Having thus explained the nature of the statistics available, their shortcomings and the direction in which they are capable of improvement, I proceed to give the results of such statistics as have been collected in past years.

Average area in each district under cultivation.—A statement appended shows this with details of the area under each crop. The annual crop returns above described being available in the annual revenue reports; the only difficulties were to ascertain a fair average for each district, and to eliminate and correct any cases in which the returns were admittedly unreliable. To this end each district officer has been asked to state the general character of each harvest for the five years ending 1876-77; and the replies received show that the average of those five years is probably on the whole a fair one. These officers have also been asked to state whether the crop returns submitted during these five years are approximately true; the answers except in seven cases being that they are. The

seven excepted cases* are those of districts under settlement; in which either the returns submitted have been estimates necessitated by the employment of the Patwāris in settlement work, or the settlement measurements have supplied more accurate data than those before available. In all seven instances the crop returns of the recent settlement measurements have been given instead of the average of the annual crop statements.

The following is a summary of the average thus obtained for the whole province; reduced to round numbers for perspicuity's sake:—

Description of Crop.	Lakhs of Acres.			Per-centage of Total Cultivation.		
	Rabi.	Kharif.	Total.	Rabi.	Kharif.	Total.
A.—Food Grains.						
Cereals.—Wheat	64	—	—	30	—	—
Barley	17	—	—	8	—	—
Rice	—	7	—	—	3	—
Jowar	—	22	—	—	10	—
Bajra	—	23	—	—	14	—
Maize	—	2	—	—	4	—
China and Kangni	—	2	—	—	1	—
Total	81	69	150	38	32½	71
Pulses.—Gram	10½	—	—	8	—	—
Pean	1	—	—	—	—	—
Masur	1½	—	—	—	—	—
Moth	—	11	—	—	5½	—
Mash and Mung	—	5	—	—	2½	—
Total	19	16	35	9½	8	17½
B.—Other Products.						
Drugs and spices	½	1½	—	½	—	—
Oil seeds	4	2	—	1	—	—
Til	—	—	—	—	—	—
Taramira	2	—	—	1	—	—
Cotton and hemp	—	8	—	—	4	—
Indigo	—	1	—	—	—	—
Sugar-cane	—	3½	—	—	1	—
Vegetables &c.	1½	—	—	—	—	—
Total (B.) other products	9	17	26	4½	8	12
Total (A.) food grains	100	85	185	47½	40	88
Grand Total	109	102	211	52	48½	100

Production, consumption, and surplus or deficiency of grain.—District officers have not been asked to state the average amount of the chief food grains produced per acre, as it was considered that their annual reports for five years past supplied answers on the subject, which however defective would be less so than any hurried answers that could now be given. They have been asked to state the surplus of food grains exported from or deficiency exported into their districts. They have not been asked to furnish a complete estimate of gross production and consumption; it was considered that such estimates, if furnished, would have been unreliable; they would have been contributed by officers of varying degrees of experience, acting on conflicting rules and conclusions. But as an approximation to such an estimate, district officers were asked in replying to question 5, to state not only the staple food of the people, but also the average consumption per family. (Their answers in full on this subject will be found in the replies to that question).

Accordingly in the papers appended will be found the following returns, on which my reply to this question will be framed:—

(a.) A statement of average produce of principal staples of agriculture in each district, (1) as reported by district officers for the five years ending 1876-77; and (2) as ascertained by experiments conducted under the orders of the Financial Commissioner during the years 1872-75.

(b.) A tabular abstract of district officers replies to question 5, showing the staple food of the people, and the rate of consumption per head.

(c.) A statement of imports and exports of agricultural produce (external trade only) compiled from

* Delhi, Gurgaon, Mooltan, Jhang, Muzaffargarh, Dera Ismail Khan, Kohat.
† Lakh=100,000.

the Punjab Trade Returns of the five years, 1873-74 to 1877-78.

Some remarks are called for in connection with the two latter returns.

(a.) *Tabular Abstract of District Officers Replies, showing Staple Food and Rate of Consumption.*—District officers were asked to give the consumption of a family of five persons, viz., one old person, a man and his wife, and two children. In not a few instances the replies (summarised below) largely over-estimate this consumption. The most obvious cases of such over-estimating are Sirsa, a dry district, where the crops are precarious, and the poorer members of the population are often insufficiently fed; Dera Ghāzi Khan, where the rate given is an impossible one, and Hazara, to which the same remark applies, and where the poorer classes among the hill people certainly eat less grain than those of the plains, supplementing their meals with milk and herbs. The rates of the Punjab are no doubt of larger stature than those of Southern and Eastern India; and the colder climate of this province would also cause a larger consumption of food than occurs in the rest of India. But any estimate based on an average consumption of food grains, amounting to 1 *ser* (2 lbs.) per head per diem is certainly excessive. It would be a large estimate to assume that a man and his wife in the prime of life together eat 2 *seers* per diem, and the two children with the old person will certainly on the average not eat 2 *seers*, thus giving less than 4 *seers* for five persons. The estimates submitted from each district multiplied by the population give an average for the whole province of 11½ *chitacks*, or 0.71 of a *ser* per head per diem. Allowing for the instances of over-estimate, the correct estimate is probably a consumption of 10 *chitacks* or 0.625 of a *ser* per head of population per diem.

TABLE showing AVERAGE DAILY CONSUMPTION per head of POPULATION per diem, in *Seers* and Decimals thereof; abstracted from District Officers' Reports.

Division.	District.	Average Daily Consumption per Head of Population.	
		By Agri-culturists.	By Non-Agri-culturists.
Delhi	Delhi	0.80	0.59
	Gurgaon	0.88	0.66
	Karnal	0.79	0.53
Hissar	Hissar	0.84	0.52
	Rohtak	0.85	0.61
	Sirsa	1.00	0.80
Umballa	Umballa	1.00	0.80
	Ludhiāna	1.00	0.74
	Simla	0.79	0.53
Jullundur	Jullundur	1.05	0.80
	Hoshiarpur	0.88	0.77
	Kangra	0.78	0.66
Amritsar	Amritsar	0.71	0.57
	Siālkot	0.73	0.50
	Gurdāspur	0.82	0.66
Lahore	Lahore	0.79	0.57
	Ferozepore	1.00	0.80
	Gujranwāla	0.88	0.79
Rawalpindi	Rawalpindi	1.06	0.91
	Jhelum	0.58	0.58
	Gujrat	1.04	0.67
Mooltan	Shahpur	0.75	0.63
	Mooltan	0.75	0.70
	Jhang	0.66	0.72
Derajat	Montgomery	0.77	0.62
	Muzaffargarh	0.82	0.80
	Dera Ismail Khan	1.00	0.70
Peshawar	Dera Ghāzi Khan	1.60	1.40
	Bannu	0.75	0.64
	Peshawar	1.00	0.90
	Kohat	0.60	0.60
	Hazara	1.31	1.03

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(b.) *Table of Imports and Exports for five years ending 1877-78.*—The figures are taken from the Punjab Trade Returns. They relate solely to the trade which crosses the frontiers of the province, and the results are to be relied on.

These, with the return of average areas under each crop before described, are the materials from which the estimate of production, consumption, and surplus of food grains desired by the Famine Commission must be formed. In the existing state of our statistics of average yield it is not practicable to submit with

this report any such estimate for each district, or for each division; it is necessary to confine the attempt to an estimate for the whole province; an unavoidable simplification which is perhaps the less to be regretted in the case of the Punjab; as the replies to questions 2 and 16 to 21 show, that trade in past years has succeeded and will certainly in future years increasingly succeed in distributing the produce of the province according to the demand in each part of it. There is no real isolation of the several parts of the province. The estimate framed accordingly is as follows:—

ESTIMATE OF FOOD GRAINS AND PULSES produced, consumed, and remaining over for Storage and Export in an average Year in the PUNJAB.

Food Grains.	PRODUCTION.			Population, Souls.	CONSUMPTION.				Surplus remaining for Storage or Export in Maunds.	Actual Exports for the 5 years ending 1877-78 in Maunds.	Difference between columns 10 and 11; i.e. amount by which surplus thus estimated exceeds average actual exports from the province.	
	Average Area Cultivated in Acres.	Estimated Produce.			Consumption at 14 lb. or 10 Chittaks Per Head of Population per Diem.	Add required for Seed Grains.		Total Consumption in Maunds.				
		Rate per Acre, Sers.	Total Produce, Mds.			Rate per Acre in Sers.	Amount required in Maunds.					
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.
Wheat - -	6,354,266	400	63,542,660	17,604,606 souls.	47,188,326	42	6,671,979	53,860,305	9,682,355	1,017,306	8,665,049	14
Barley - -	1,685,025	400	16,850,250		-	35	1,474,397	-	-	-	-	-
Rice - -	728,259	400	7,282,590		-	32	582,607	-	-	-	-	-
Jowár and bájra	5,129,248	250	32,057,800		-	5	641,156	-	-	-	-	-
Maize - -	921,068	300	6,014,760		-	14	322,089	-	-	-	-	-
Chíná and kangri	163,290	200	816,400		-	10	40,820	-	-	-	-	-
Total - -	8,027,780	296	63,921,800		37,148,256	-	3,061,669	40,209,925	23,711,875	3,400,184	24,761,619	29
Pulses { Gram -	1,650,727	300	12,380,452		-	20	825,363	-	-			
Others - -	1,887,073	200	9,435,365		-	8	377,415	-	-			
Total - -	3,537,800	247	21,815,817		16,064,111	-	1,202,778	17,266,889	4,548,928	-	-	-
Grand Total -	18,519,546	322	149,280,277	100,400,693	-	10,936,426	111,337,119	37,943,153	4,516,490*	33,426,668	22	

* It is worth while noting, that the nett exports of these grains, down the Indus between the years 1861-62 and 1867-68, as registered at Mithankot, just below the junction of the Indus and Chenab, averaged only 480,212 maunds. Compare the later entries in the statement of exports appended. Exports by railway were impossible 10 years ago.

The rates of yield assumed in this estimate are the average of the rates reported by district officers for five years past; and whereas in the case of the inferior grains this could not be stated from those reports separately for each kind of grain, the average of the Financial Commissioner's experiments has been adopted. This was the only course open, as no other estimates are of a sufficiently general character. The rate of seed per acre is for the same reason taken from the Financial Commissioner's experiments. The rate of consumption assumed is 10 chitaks per head per diem, and the consumption is divided between wheat, inferior grains and pulses in the same proportion as is given in the appended tabulated statement of district officers replies, viz., wheat 47 per cent., inferior grains 37, and pulses 16. Given the produce and consumption at these rates (columns 1-9), the surplus remaining is compared in columns 10 and 11 with the nett average on rural exports. Columns 12 and 13 show the difference between this surplus and the average exports. The value of the estimate may consequently be held with fairness to depend on the possibility of giving a reasonable explanation of the discrepancy exhibited in columns 12 and 13. The details at our command limit the argument at the outside to the two heads of (1) wheat and (2) other food grains. If district officers have over-estimated the consumption of wheat relatively with other grains by even so small a proportion as 8 per cent., of the total food, the excess

of wheat shown in column 12 of the estimate would disappear, and be transferred to the head of other grains. Therefore it is necessary to avoid details of kind, and to limit the argument to the total discrepancy; which is 33,426,668 maunds.

Now the estimate includes no allowance for the grain consumed by sheep, kine, camels, and horses. From data obtained from the Commissariat, Departments I have ascertained that the military establishments in the Punjab (elephants, horses, mules, ponies, and bullocks) consume about 700,000 maunds of grain per annum; if we add to this the consumption of the horsed dak lines Government bullock trains, and the private establishments of our civil and military cantonments, we may take the total consumption on this head at 1,000,000 maunds per annum; though Mr. Ouseley thinks 900,000 maunds a safer conclusion.

There remains the grain consumed by cattle owned by the people of the country. The agriculturists do not usually feed their cattle with grain; but the townspeople do to a certain extent, especially their cows. The drivers of bullock carts always feed their cattle with two or three sers of grain when working. Bullocks, ponies, and mules are similarly fed when carrying pack loads. And there is a certain very limited consumption in feeding up cattle and sheep for slaughter. It is difficult to put the consumption under these various heads at less than 6,000,000

maunds per annum; of which two-thirds is consumed by draught and pack cattle.*

And lastly, a certain reasonable amount should be allowed for dryage and loss in storage; say 5 per cent. of the total produce:—

The surplus shown in the Maunds.
estimate was - - 33,426,668

Deduct on the grounds above stated,—

(1.) Consumption of the military establishments, dak lines, and cantonments - - 1,000,000
(2.) Consumed by cattle, &c. - 6,000,000
(5.) 5 per cent. of total production for dryage and loss in storing - - 7,464,014

Total deducted - 14,464,014

* The total stock in the Punjab is,—

cows, bullocks and buffaloes - - 6,570,212
horses - - - 84,634
ponies and mules - - - 51,395
donkeys - - - 288,118
sheep and goats - - - 3,849,842
camels - - - 165,567
carts - - - 97,909

So there remains over and above the estimated expenditure a balance of the estimated production amounting to maunds - - - 18,962,654

This balance is 13 per cent., of the total estimated production: and the average estimated produce per acre of all food grains being 322 sers, or 644 lbs., this result indicates an excess estimate on the rate of production of 46 sers or 92 lbs. per acre. The estimate therefore indicates that on the whole province the average rate of production of food grains (pulses included) per acre is not more than 322 sers, and not less than 276 sers. The rate of consumption on which the lower estimate is based is certainly a moderate one. The consumption of grain by the cattle of the country is probably under-estimated; but as it is a point on which we have little information, a low estimate of it has been taken.

CHAP. I. QN. 3.
PUNJAB.
Major Wace.

STATEMENT in ACRES showing the average Area cultivated with each crop during the Five Years 1872-73 to 1876-77, compiled from Statements No. XXIX. appended to the Annual Revenue Reports for those Years.

NOTE.—The Districts marked * reported that these Returns were not reliable; and in such Districts Returns supplied from recent Settlement measurements have been substituted.

CEREALS AND PULSES USED AS FOOD.

Division.	District.	Harvest.	CEREALS.										PULSES.					TOTAL.			
			Wheat.	T. Barley.	Rice.	T. Jowar (Great Milllet).	S. Bajra (Spiked Milllet).	S. Kanari (Italian Milllet).	S. Makka (Indian Corn).	China.	Gram.	Matar (Peas).	Masur.	Arhar.	Moth.	Mash.	Mung.	Cereals.	Pulses.	Total.	
Delhi	Delhi*	Rabi	1,26,800	66,392	11,819	1,03,115	90,320	76	8,040	266	172,306	1,429	100	290	7,215	1,213	16,063	1,83,131	73,795	2,66,926	21
	Gurgaon*	Rabi	75,327	1,43,337	809	1,58,723	2,89,982	166	627	—	1,14,798	280	100	101	1,28,253	218	19,542	2,13,536	1,18,171	3,31,707	20
	Karnal	Rabi	1,13,222	33,255	53,356	1,03,549	31,325	185	9,891	315	78,376	2	2,667	—	9,404	10,483	11,155	1,46,792	81,045	2,27,837	21
Hissar	Hissar	Rabi	41,514	36,921	10,756	2,18,533	6,92,271	—	1,325	—	61,275	—	—	13,300	—	1,05,388	19,356	78,433	61,275	1,39,710	21
	Rohatak	Rabi	1,16,467	70,436	4,080	1,88,324	1,65,491	141	559	45	1,55,256	—	400	—	23,768	10,412	19,284	1,53,065	1,25,720	2,78,785	21
	Sirsa	Rabi	43,708	81,076	6,082	97,732	4,50,720	11	268	36	31,277	279	790	—	1,53,505	629	4,596	1,55,733	1,64,776	3,20,509	21
Unbala	Unbala	Rabi	2,79,150	44,777	1,25,071	1,13,886	20,612	1,049	1,10,463	13,872	1,51,733	1,471	13,863	—	17,136	19,000	1,114	3,23,927	1,93,327	5,17,254	21
	Ludhiana	Rabi	1,88,123	65,240	3,316	1,10,756	6,308	32	56,393	159	1,47,728	—	3,065	—	56,493	9,130	11,641	1,76,800	77,294	2,54,093	21
	Simla	Rabi	3,066	1,260	1,109	174	149	40	1,287	923	—	8	21	—	—	105	—	1,76,800	77,294	2,54,093	21
Jullundur	Jullundur	Rabi	2,89,170	21,050	11,117	1,00,338	—	438	1,08,460	13,124	55,011	—	9,637	—	36,542	20,965	1,900	3,14,220	65,248	3,79,468	21
	Hoshiarpur	Rabi	3,30,709	37,475	55,696	45,797	11,969	3,186	1,01,549	7,503	53,086	1,388	21,863	783	23,667	23,683	5,281	2,37,197	1,25,653	3,62,850	21
	Kangra	Rabi	1,24,745	42,595	1,20,792	83,821	10,574	304	62,142	1,948	94,753	2,859	4,448	404	1,234	14,197	306	1,57,310	1,02,400	2,59,710	21
Amritsar	Amritsar	Rabi	2,80,688	37,213	25,515	70,389	—	12	4,045	8,312	80,967	—	4,296	—	18,491	—	889	2,08,001	94,263	3,02,264	21
	Sialkot	Rabi	843,718	82,412	81,049	53,467	4,043	8,664	42,271	1,050	13,356	1,711	20,139	10	12,269	10,450	1,324	1,53,149	31,798	1,84,947	21
	Gurdaspur	Rabi	2,05,847	1,50,682	79,214	83,821	10,574	6,577	38,067	1,485	22,533	2,806	12,671	—	17,990	10,620	1,302	1,74,788	33,912	2,10,650	21
Lahore	Lahore	Rabi	2,54,070	39,997	19,175	70,231	1,806	16	20,737	21	1,15,085	6	7,376	—	50,103	11,550	9,966	2,94,104	1,22,467	4,16,571	21
	Ferozepore	Rabi	2,07,192	1,45,060	3,947	1,95,032	63,973	1,203	34,337	4,691	1,48,630	2	15,400	—	24,680	24,680	26,524	3,52,587	1,64,001	5,16,588	21
	Gujánwála	Rabi	1,80,443	6,349	13,327	43,430	5,656	1,201	13,768	5,884	24,238	568	1,272	46	46,360	1,636	10,076	2,91,792	26,376	3,18,168	21
Rawalpindi	Rawalpindi	Rabi	3,65,797	59,321	—	44,569	1,68,202	2,783	4,061	—	37,729	201	2,023	—	7,614	244	1,532	83,361	64,563	1,47,927	21
	Jhelum	Rabi	4,13,619	36,492	1,129	39,387	2,01,202	102	2,920	2,342	27,683	114	992	—	45,157	4,658	20,606	2,09,754	72,781	2,82,535	21
	Gujrat	Rabi	2,40,813	67,576	28,482	55,172	1,20,892	1,130	16,476	2,127	28,374	311	7,873	—	36,056	1,763	12,908	3,09,283	37,058	3,46,340	21
Mooltan	Shahpur	Rabi	1,57,685	11,124	800	13,755	74,660	426	911	1,505	11,884	158	613	—	29,292	3,312	2,150	1,70,517	12,655	1,83,172	21
	Mooltan*	Rabi	2,47,917	4,578	8,827	64,658	11,469	604	163	115	14,883	27,010	1,145	—	7,614	244	1,532	2,52,610	43,088	2,95,698	21
	Jhang*	Rabi	1,76,403	6,188	150	38,004	1,823	832	2,239	4,374	13,969	4,887	2,435	—	271	1,557	216	1,81,681	24,901	2,06,582	21
Montgomery*	Montgomery*	Rabi	2,00,043	31,135	10,611	23,222	246	5	1,880	2,907	30,080	9,358	5,370	331	403	9,173	551	2,31,889	45,321	2,77,210	21
	Rawalpindi	Rabi	2,03,215	10,669	10,333	21,545	13,241	285	—	1,266	12,798	24,926	4,477	—	2,457	4,849	2,572	51,690	42,189	93,879	21
	Muzaffargarh*	Rabi	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	21,314	2,169	2,333	21

STATEMENT in ACRES showing the Average Area cultivated with each Crop—continued.

NOTE.—The Districts marked * reported that these Returns were not reliable; and in such Districts Returns supplied from recent Settlement measurements have been substituted.

OTHER PRODUCTS.

Division.	District.	Harvest.	DRUGS AND SPICES.										OIL SEEDS.				FIBRES.		DYES.		Tea.	Sugar-cane.	Total other Products.	Grand Total Products.
			Poppy.	Tobacco.	Turmeric.	Coriander Seed.	Ginger.	Chillies.	Other kinds.	Linseed.	Sarso (Mustard).	Til (Sesamum).	Taramira (Spi-napis erica).	Cotton.	Hemp.	Kasumbha (Shaf-flower).	Indigo.	Vegetables.						
Delhi	Delhi*	0.	22.	23.	24.	25.	26.	27.	28.	29.	30.	31.	32.	33.	34.	35.	36.	37.	38.	39.	40.	41.		

STATEMENT in ACRES showing the Average Area cultivated with each Crop—*continued*.

NOTE.—The Districts marked * reported that these Returns were not reliable, and in such Districts Returns supplied from recent Settlement measurements have been substituted.

CEREALS AND PULSES USED AS FOOD.

Division.	District.	Harvest.	CEREALS.						PULSES.						TOTAL.					
			Wheat.	Jan (Barley).	Rice.	Jowar (Great Millet).	Bajra (Spiked Millet).	Kanuri (Italian Millet).	Makkai (Indian Corn).	Chinna.	Gram.	Matar (Peas).	Masur.	Arhar.	Moth.	Mash.	Mung.	Cereals.	Pulses.	Total Food Grains.
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.	21.
Deralet	Dera Ismail Khan*	Rabi Kharif	3,19,502	14,907	1,970	25,917	2,62,903	1,816	139	92	18,084	17,162	1,620	—	724	50	2,576	334,009	36,836	6,71,275
		Rabi Kharif	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2,92,537	3,350	2,96,187
	Dera Ghazi Khan	Rabi Kharif	1,26,340	11,228	11,073	93,616	31,787	16	61	11	2,452	6,256	5,281	1	230	372	144	1,37,595	14,095	1,51,690
	Bannu	Rabi Kharif	2,34,572	28,509	384	11,641	89,228	—	24,045	—	48,895	6,918	5,712	—	4,764	—	3,742	6,63,171	69,985	8,24,156
		Rabi Kharif	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1,25,248	11,668	1,36,917
Peshawar	Peshawar	Rabi Kharif	2,90,562	2,12,280	10,329	62,883	2,927	1,611	50,827	34	189	138	1,648	433	16,555	3,227	3,429	5,02,840	2,063	5,04,903
		Rabi Kharif	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1,56,981	23,674	1,80,655
	Kohat*	Rabi Kharif	97,533	10,014	2,361	2,213	47,842	2,106	12,950	—	1,984	—	—	—	6,327	—	11,473	1,07,547	1,884	1,09,531
	Hazara	Rabi Kharif	93,167	49,544	5,650	1,148	26,010	20,515	90,055	2	929	924	1,078	—	10,812	2,436	4	66,942	17,891	84,746
		Rabi Kharif	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1,42,711	9,911	1,52,622
	Grand Total	Rabi Kharif	63,54,266	16,85,025	7,58,259	22,24,837	29,04,411	78,770	9,21,968	5,853	16,50,727	14,613	1,57,225	420	10,62,383	165	2,93,018	80,43,197	19,23,232	99,66,429
		Rabi Kharif	—	—	—	—	—	—	—	80,004	—	1,843	—	15,686	—	—	—	69,38,849	16,14,668	85,53,517

TOTAL OF EACH DIVISION.

[illegible]

STATEMENT in ACRES showing the Average Area cultivated with each Crop—*continued*.

NOTE.—The Districts marked * reported that these Returns were not reliable; and in such Districts Returns supplied from recent Settlement measurements have been substituted.

OTHER PRODUCTS.

[illegible]

TOTAL OF EACH DIVISION.

[illegible]

ABSTRACT IN ACRES.

CHAP. I. QN. 3.
PUNJAB.
Major Wace.

DIVISION.	Harvest.	Cereals.	Pulses.	Total.	Other. Products.	GRAND TOTAL.	
						Harvests.	Total.
Delhi	Rabi Kharif	5,59,647 8,62,259	2,70,018 2,04,072	8,29,665 10,66,331	32,898 1,85,432	8,62,563 12,51,763	21,14,326
Hissar	Rabi Kharif	3,90,863 18,37,833	2,19,277 5,23,119	6,10,140 23,60,952	55,812 1,90,368	6,65,952 25,51,320	32,17,272
Umballa	Rabi Kharif	5,81,626 5,65,344	3,17,351 1,14,687	8,98,977 6,80,031	68,059 1,14,664	9,67,036 7,94,695	17,61,731
Jullundur	Rabi Kharif	8,49,744 6,58,256	2,43,615 1,33,866	10,93,359 7,92,131	82,673 1,89,290	11,76,032 9,81,421	21,57,453
Amritsar	Rabi Kharif	10,59,660 5,20,461	1,67,479 92,063	12,27,139 6,12,524	95,714 2,31,029	13,22,853 8,43,553	21,66,406
Lahore	Rabi Kharif	8,88,183 5,17,974	3,13,444 2,75,797	12,01,627 7,93,771	1,41,075 1,76,698	13,42,702 9,70,469	23,13,171
Rawalpindi	Rabi Kharif	13,46,107 8,30,613	1,18,465 1,67,160	14,64,572 9,97,773	2,17,233 1,58,525	16,81,805 11,56,298	28,38,103
Mooltan	Rabi Kharif	8,79,094 2,41,156	1,55,349 26,835	10,34,443 2,67,991	1,10,023 2,31,408	11,44,466 4,99,399	16,43,865
Derajat	Rabi Kharif	7,35,175 5,54,761	1,11,946 15,665	8,47,121 5,70,426	1,11,688 97,672	9,58,809 6,68,098	16,26,907
Peshawar	Rabi Kharif	7,53,098 3,50,183	6,288 61,304	7,59,386 4,11,487	42,007 60,342	8,01,393 4,71,829	12,73,222
Grand Total	Rabi Kharif	80,43,197 69,38,849	19,23,232 16,14,568	99,66,429 85,53,417	9,57,182 16,35,428	1,09,23,611 1,01,88,845	2,11,12,456

ABSTRACT IN PER-CENTAGE.

DIVISION.	Harvest.	Cereals.	Pulses.	Total.	Other. Products.	Total.	REMARKS.
Delhi	Rabi Kharif	26 41	13 10	39 51	1 9	40 60	100
Hissar	Rabi Kharif	12 57	7 16	19 73	2 6	21 79	100
Umballa	Rabi Kharif	33 32	18 7	51 39	4 6	55 45	100
Jullundur	Rabi Kharif	40 30	11 6	51 36	4 9	55 45	100
Amritsar	Rabi Kharif	49 24	8 4	57 28	4 11	61 39	100
Lahore	Rabi Kharif	39 22	13 12	52 34	6 8	58 42	100
Rawalpindi	Rabi Kharif	47 29	4 5	51 34	8 7	59 41	100
Mooltan	Rabi Kharif	53 15	9 2	62 17	7 14	69 31	100
Derajat	Rabi Kharif	45 34	7 1	52 35	7 6	59 41	100
Peshawar	Rabi Kharif	59 27	1 5	60 32	3 5	63 37	100
Total	Rabi Kharif	38 33	9 8	47 41	4 8	51 49	100

AGRICULTURAL STATISTICS.

AVERAGE PRODUCE OF PRINCIPAL STAPLES of AGRICULTURE in the PUNJAB.

Crop.	Period.	Produce per Acre in Lbs.	Authority.
Wheat	1872-77	826	District reports.
"	1872-75	884	Financial Commissioner's experiments.
Rice	1872-77	869	District reports.
"	1872-75	854	Financial Commissioner's experiments.
Inferior Grains :	1872-77	665	District reports.
Barley	1872-75	1,015	Financial Commissioner's experiments.
Joár	"	610	" " "
Bajra	"	477	" " "
Maize	"	598	" " "
Kangni	"	447	" " "
China	"	458	" " "
Peas	"	493	" " "
Masur	"	224	" " "
Moth	"	393	" " "
Mash	"	418	" " "
Mung	"	412	" " "
Gram	1872-77	756	District reports.
"	1872-75	253	Financial Commissioner's experiments.
Oil Seeds :	1872-77	421	District reports.
Rape or Mustard	1872-75	458	Financial Commissioner's experiments.
Linseed	"	372	" " "
Til	"	274	" " "
Taramira	"	313	" " "
Cotton	1872-77	107	District reports.
"	1872-75	363	Financial Commissioner's experiments.

STATEMENT OF IMPORTS AND EXPORTS OF FOOD GRAINS, OIL SEEDS, AND BUTTER (GHI), compiled from the PUNJAB TRADE RETURNS commencing 1869-70 and ending 1877-78.

Explanation.—The North Frontier trade is with Bajaur (North of Peshawar) and with Kashmir and Central Asia North thereof.

The West Frontier trade is with Afghanistan.

The South Frontier trade is with Sind, Baluchistan, Bikaner, and Jaipur. Nearly all the river trade is with Sind.

The East Frontier trade is with the North-Western Provinces and other British Provinces supplied through them. The Railway exports to Calcutta and Bombay are consequently included under this head

Across what Frontier.	WHEAT.		OTHER FOOD GRAINS.		GHI.		OIL SEEDS.		OIL.		TOTAL.	
	Imports.	Exports.	Imports.	Exports.	Imports.	Exports.	Imports.	Exports.	Imports.	Exports.	Imports.	Exports.
North Frontier—By native carriage	—	—	26,803	10,653	20,963	—	1873-74	—	—	—	53,865	10,748
West Frontier—By native carriage	—	—	901	126	2,670	—	21	—	25	—	3,371	126
South Frontier—By native land carriage	—	—	36,025	4,051,142	3,621	1,419	4,006	13,038	—	4,045	44,322	4,23,644
By native boats on the Indus	—	—	49,269	6,51,678	42	7,147	15	1,80,747	2,510	209	51,836	8,39,781
By Steam Flotilla on the	—	—	Not shown	—	Not shown	—	Not shown	—	Not shown	—	Not shown	Not shown
Chenab and Indus.	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	85,364	10,56,820	3,663	8,566	4,631	1,83,785	2,510	4,254	96,158	12,63,425
East Frontier—By native land carriage	—	—	2,04,500	14,39,350	770	365	13,471	85,776	310	1,565	2,19,051	15,26,065
By Sind, Punjab, and Delhi	—	—	Page 10 of Report.	27,01,990	Not shown	—	Not shown	—	Not shown	—	—	32,96,778
Railway.	—	—	29,483	11,67,512	21,019	746	25,316	1,01,660	—	—	75,818	12,69,918
By East Indian State Railway	—	—	2,33,983	53,07,861	21,789	1,111	38,787	1,87,436	310	1,565	2,94,869	60,92,761
Total	—	—	3,47,051	63,75,460	49,085	9,698	48,482	3,81,290	2,845	5,819	4,47,463	73,67,055
Grand Total	—	—	—	—	—	—	—	—	—	—	—	—
North Frontier—By native carriage	20,900	93,059	46,016	55,548	36,093	—	1874-75	—	1,468	725	1,12,359	1,58,694
West Frontier—By native carriage	73,438	39,079	15,521	19,387	3,952	13	149	—	1,031	860	94,091	59,339
South Frontier—By native land carriage	78,121	1,69,854	1,23,702	6,15,590	6,445	4,821	39,515	38,563	2,034	10,053	3,19,817	8,38,881
By native boats on the Indus	140	2,86,393	13,770	2,18,196	—	2,896	—	2,06,792	4,012	11,732	17,922	7,26,609
By Steam Flotilla on the	Not shown	—	Not shown	—	Not shown	—	Not shown	—	Not shown	—	Not shown	Not shown
Chenab and Indus.	78,261	4,56,847	2,07,472	8,33,786	6,445	7,717	39,515	2,45,355	6,046	21,785	3,37,739	15,65,490
Total	4,03,468	10,73,869	1,73,672	3,79,350	2,325	8,302	10,692	34,296	2,284	4,796	5,92,441	15,00,613
East Frontier—By Sind, Punjab, and Delhi	6,109	7,23,512	68,153	20,10,449	571	72	2,929	47,007	4,245	19,774	82,007	28,05,814
Railway.	—	—	—	—	—	—	—	—	—	—	—	—
By East Indian State Railway	73,674	2,49,523	—	—	30,352	508	—	—	—	—	1,04,026	2,50,031
Total	4,83,231	20,51,904	2,41,825	23,89,799	33,248	8,382	13,621	81,303	6,529	24,570	7,78,474	45,56,458
Grand Total	6,53,850	26,45,889	5,10,834	32,98,520	79,738	20,012	61,167	3,27,620	15,074	47,940	13,22,663	63,39,981

Across what Frontier.	WHEAT.		OTHER FOOD GRAINS.		GHI.		OIL SEEDS.		OIL.		TOTAL.	
	Imports.	Exports.	Imports.	Exports.	Imports.	Exports.	Imports.	Exports.	Imports.	Exports.	Imports.	Exports.
North Frontier—By native carriage	37,303	90,579	64,723	83,402	42,615	—	1875-76	—	3,618	2,079	1,59,413	1,77,685
West Frontier—By native carriage	19,643	37,084	7,002	38,970	5,390	—	3	11,153	53	762	32,374	76,943
South Frontier—By native land carriage	30,036	1,53,801	2,46,889	3,46,190	3,987	3,882	79,016	48,680	36,549	4,853	3,96,477	5,56,906
By native boats on the Indus	—	4,22,267	3,683	1,82,879	5	2,920	—	2,99,638	509	739	2,99,638	9,08,433
By Steam Flotilla on the	—	2	1,041	3,517	2	114	—	8,25,537	3,171	24	4,197	3,29,194
Chenab and Indus.	—	—	—	—	—	—	—	—	—	—	—	—
Total	30,036	5,76,070	2,51,613	5,33,586	3,994	6,416	79,016	6,73,845	40,229	5,616	4,04,888	17,94,533
East Frontier—By native land carriage	3,67,593	12,130	1,10,380	1,55,219	906	6,194	4,584	67,801	726	3,310	4,84,199	2,44,654
By Sind, Punjab, and Delhi	37,740	4,175	2,06,636	2,10,150	495	77	1,147	60,592	5,833	44,763	2,51,901	3,19,757
Railway.	—	—	—	—	—	—	—	—	—	—	—	—
By East Indian State Railway	3,38,339	20,539	—	—	15,581	258	25,906	16,882	1,144	1,360	3,80,970	39,039
Total	7,43,672	36,844	3,17,076	3,65,369	16,982	6,529	31,637	1,45,275	7,703	49,433	11,17,070	6,03,450
Grand Total	8,30,654	7,40,577	6,40,414	10,20,327	68,982	12,950	1,22,092	8,20,867	51,603	57,890	17,13,745	26,52,611
North Frontier—By native carriage	16,758	88,820	33,127	55,752	43,462	11	22,438	539	2,143	1,460	1,17,928	1,46,582
West Frontier—By native carriage	24,618	49,820	14,964	34,879	8,941	32	459	160	97	898	48,979	85,389
South Frontier—By native land carriage	41,358	1,48,431	2,79,811	3,29,378	10,969	2,040	1,44,813	43,279	8,222	3,623	4,85,173	5,26,751
By native boats on the Indus	—	5,77,556	4,710	1,80,556	—	7,063	33	6,40,782	1,171	2,316	3,914	14,08,473
By Steam Flotilla on the	—	17,397	309	15,742	—	224	—	4,17,929	2,337	4	2,646	4,51,296
Chenab and Indus.	—	—	—	—	—	—	—	—	—	—	—	—
Total	41,358	7,43,384	2,84,830	5,25,676	10,969	9,327	1,44,846	11,01,990	11,730	5,943	4,93,733	23,86,520
East Frontier—By native land carriage	5,07,681	26,404	1,17,999	3,05,665	3,389	9,527	4,671	57,412	4,134	1,524	6,37,874	4,00,832
By Sind, Punjab, and Delhi	28,736	16,782	2,75,194	5,14,394	79	79	6,766	39,600	8,399	15,577	3,19,174	5,86,432
Railway.	—	—	—	—	—	—	—	—	—	—	—	—
By East Indian State Railway	69,231	2,15,101	1,09,324	1,55,229	1,875	2,089	37,884	2,81,870	6,994	956	2,24,308	6,55,245
Total	6,04,648	2,58,287	5,02,517	9,75,288	5,343	11,695	49,321	3,78,882	19,527	18,057	11,81,356	16,42,209
Grand Total	6,87,382	11,40,011	8,35,438	15,91,595	68,615	21,065	2,17,064	14,81,571	33,497	26,358	18,41,996	42,60,800
North Frontier—By native carriage	33,175	2,14,315	35,437	1,27,463	45,427	2	23,169	288	5,406	1,026	1,42,614	3,43,094
West Frontier—By native carriage	12,684	31,920	7,703	20,246	11,290	7	171	25	186	25	32,034	51,923
South Frontier—By native land carriage	60,568	98,291	1,09,342	2,91,935	3,975	2,973	29,555	7,499	2,151	2,433	2,65,991	4,03,131
By native boats on the Indus	1,855	12,14,584	11,758	3,38,330	60	23,820	831	2,87,108	3,255	—	17,759	18,63,842
By Steam Flotilla on the	—	86,176	224	48,570	—	6,124	200	1,26,893	4,556	662	4,980	2,67,925
Chenab and Indus.	—	—	—	—	—	—	—	—	—	—	—	—
Total	62,423	13,99,051	1,81,324	6,78,835	4,035	32,917	30,986	4,21,000	9,962	3,095	2,88,730	25,34,898
East Frontier—By native land carriage	7,38,807	1,47,307	78,251	13,58,159	9,633	6,709	21,049	72,837	5,437	748	8,53,177	15,85,760
By Sind, Punjab, and Delhi	48,772	9,01,833	1,30,206	58,33,217	1,366	2,022	23,978	12,511	21,987	1,477	2,26,309	67,51,060
Railway.	—	—	—	—	—	—	—	—	—	—	—	—
By East Indian State Railway	6,788	3,47,672	1,21,368	60,121	5,466	2,073	82,322	32,646	11,572	327	2,27,516	4,42,839
Total	7,94,367	13,96,812	3,29,825	72,51,497	16,465	10,804	1,27,349	1,17,994	38,996	2,552	13,07,002	87,79,659
Grand Total	9,02,649	30,41,798	5,54,289	80,78,041	77,217	49,730	1,81,675	5,39,307	54,550	6,698	17,70,380	11,79,574

ABSTRACT of the foregoing.

	1873-74.			1874-75.			1875-76.			1876-77.			1877-78.			Average of the Five Years ending 1877-78.		
	Imports.	Exports.	Excess of Exports.	Imports.	Exports.	Excess of Exports.	Imports.	Exports.	Excess of Exports.	Imports.	Exports.	Excess of Exports.	Imports.	Exports.	Excess of Exports.	Imports.	Exports.	Excess of Exports.
Wheat	-	5,94,788	5,94,788	-	26,45,889	19,90,039	8,30,654	7,40,577	-90,077	6,87,382	11,40,011	4,52,629	9,02,649	30,41,798	21,39,149	6,15,907	16,32,613	10,17,306
Other food grains	3,47,051	63,75,460	60,28,409	5,10,834	32,98,530	27,87,686	6,40,414	10,20,327	3,79,913	8,35,438	15,91,595	7,56,157	5,54,289	80,78,041	75,23,732	5,73,605	40,72,789	34,99,184
Total	3,47,051	69,70,248	66,23,197	11,66,664	59,44,409	47,77,725	14,71,068	17,60,904	2,89,836	15,22,820	27,31,606	12,08,786	14,56,938	1,11,19,839	96,62,901	11,88,912	57,05,402	45,16,490
Oil seeds	48,482	3,81,290	3,32,808	61,157	3,27,620	2,66,463	1,22,092	8,20,867	6,98,775	2,17,064	14,81,571	12,64,507	1,81,675	5,39,307	3,57,632	1,30,096	7,10,131	5,80,035
Oil	2,845	5,819	2,974	15,074	47,940	32,866	51,603	57,890	6,287	33,497	26,358	-7,139	54,550	6,698	-47,852	31,514	28,541	-2,973
Ghi	49,085	9,698	39,387	79,738	20,012	-59,726	68,982	12,950	-56,032	68,615	21,065	-47,550	77,217	43,730	-33,487	68,727	21,491	-47,236
Grand total	4,47,463	73,67,055	69,19,592	13,22,663	63,39,931	50,17,318	17,13,745	26,52,611	9,38,866	18,41,996	42,60,600	24,18,604	17,70,380	1,17,09,574	99,39,194	14,19,249	64,65,565	50,46,316

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The statistics now submitted of the average cultivation, produce, and consumption in the districts of the North-Western Provinces are derived from four sources:—

- The administration reports of the Board of Revenue for 10 years from 1867.
- The latest settlement reports available.
- The village field records compiled under the new system for 1876-77 (those for 1877-78 are not used, being of an abnormal character on account of the drought).
- The replies of district authorities to the famine queries.

In the returns, figures, except for total area, are given in even thousands.

Sources (ii.) and (iii.) are not available for the permanently settled districts.

The statistics of administration reports are very unsatisfactory and unreliable since the same figures have been repeated without alteration for a long series of years, and are evidently not the result of fresh inquiry each year.

The settlement statistics are of varied value—those of earlier years being very much more imperfect than those of later date, but both are equally subject to defect on the following grounds:—

- That landholders purposely throw land out of cultivation in the years of measurement in order to deceive assessing officers.
- That settlement surveyors often omit to record crops not standing at the time of survey, so that estimates of produce deduced from their returns must often be below the mark.

The village returns under the new system of field records ought to provide the best statistics, but the year for which they are reported was the first year in which the system was introduced, and a great deal of inaccuracy resulted from inexperience and delay in commencing work.

The district officers replies are probably based on one or other of the above data, but so little explanation was afforded concerning the figures originally submitted that it was found necessary to make further inquiries, which have not been as yet completely answered.

Mode of Collecting Agricultural Statistics.—It is necessary to notice here the machinery by which agricultural statistics are now collected in the North-Western Provinces.

To every cultivated area of 1,500 to 2,000 acres there is a native official called the village accountant (or *patwari*), whose duty it has now been made to note each year in a field-book the agricultural circumstances of each field in his circle—e.g., crop or crops, rent, tenancy, &c. Abstracts are compiled from the field-book, which show in tabular forms the complete agricultural circumstances of every village. To superintend every 30 or 40 *patwaris* is an overseer, called a *kanungo*, whose duty it is to instruct and supervise them in their work, and also to compile similar abstracts for each portion of the district under his supervision.

The question is asked whether any suggestions can be offered for the improvement of agricultural statistics. It is sufficient to reply that, as far as these provinces are concerned, the system which has been described forms the most complete basis which it is possible to establish for the collection of agricultural statistics, and only requires thorough supervision by district officers to ensure accurate results. The Government of these provinces and the Board of Revenue have taken measures through the Agricultural Department to maintain sufficiently strict inspection for the purpose. The outcome of the system will be a series of statistical volumes, which, containing annual

entries excerpted by *kanungos* from the *patwaris* records of the year, will exhibit under appropriate heads the fiscal and agricultural history of each mahal, village, and district for the period over which they extend, and thus provide a sound basis for future revenue and settlement operations.

The "further inquiries," to which reference has been made, have been instituted through this agency, and the replies received must be accepted as the best obtainable, as there is no time for further revision. A great deal of the information required would previously have been forthcoming had it not been for the occurrence of the late drought, which compelled district officers to utilise the establishment for more urgent work (connected with the exigencies of the season) almost immediately after the introduction of the new system.

DIVISION OF PROVINCE INTO BELTS.

In dealing with the statistics of the province some acquaintance with the changes which occur in its physical characteristics from north-west to south-east is necessary. Tracts differing in climate, temperature, soil, and moisture are followed by different agricultural conditions, are differently affected by a failure of rain, and require different treatment as regards irrigation. Changes, such as those to which reference is made, are not continuous with district boundaries, a fact which makes it difficult to accept the district as the unit with which we should deal.*

The province is divided into four belts approximately parallel to the Himalayas, of which the characteristics are more or less different; but it must be borne in mind that the change from one belt to another is not abrupt but gradual, and it must also be remembered that a simultaneous and gradual change in physical conditions also occurs from north-west to south-east at right angles to the line of the belts.

I.—SUB-HIMALAYAN BELT.

The first or Sub-Himalayan belt has water near the surface, and the soil is usually so moist that artificial irrigation is not needed. The main crops are sugar-cane, rice, and cereals, of which even sugar-cane is not artificially irrigated, a fact which has surprised many accustomed to the necessity of plentiful watering for cane in other parts of the province. To give instances at either extremity of the belt:—Of the cultivated area in the district of Bijnor only 5.8 per cent. was irrigated at the time of settlement, whereas sugar occupied 14 per cent. of the area; and of Tilpur, a typical pargana in the north of Gorakhpur District, the settlement officer writes: "Irrigation is not cared for. The soil is lusty and moist, producing all the ordinary crops in abundance without any artificial watering. There are 390 wells used, generally not for irrigation, but for the other purposes of life. The average depth of water is 8 feet, and of the water itself 6 feet."

The settlement officer of Bijnor writes: "Masonry wells are hardly ever constructed, but earthen wells (mere excavation of a shaft) can be made almost everywhere." Of Bareilly: "Owing to the abundant rainfall and nearness of water to the surface, irrigation is not nearly so necessary with us as in the Doab. In the northern parganas (i.e., the nearest to the hill range), fine wheat and even sugar-cane are grown without any irrigation at all," and even where wells are used "only one watering for spring cereals is necessary." So also the settlement officer of Shābjahānpur

* Another reason is that information from some districts is not only deficient but misleading.

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writes: "One watering is sufficient, and that often a sprinkling rather than a slushing, so that it is impossible to give any average area of irrigation per well.

Some use has, however, been made of rivers in utilising the fall of streams issuing from the hills both in small canals and in damming up channels, but in considering this source of irrigation it must be distinctly remembered that districts in Rohilkhand run closer to the foot of the range than districts in Oudh and east of Oudh, where they are separated from the hills by a strip of level plain belonging to Nepal. The utilisation of stream fall is therefore easier towards the west than towards the east of our Sub-Himalayan belt. Small canals have been made in Bijnor, the most westerly district, but the settlement officer still remarks that "the irrigating power of the Bijnor river, is by no means worked up to its potential limit," and while General Ramsay has shown what can be done at the very foot of the mountain slope in his Bhábar canals, but little scientific work has been effected in any other portion of the belt, the most notable exception being the almost thorough protection of a Government grant estate by its owner in the north of the Gorakhpur District.

The above is a general indication of existing circumstances in the north or Sub-Himalayan belt.

II.—ROHILKHAND AND GANGES-GOGRA BELT.

The second belt, roughly termed the Rohilkhand and Ganges-Gogra belt, approaches in the northern direction the Sub-Himalayan character,* and the Doáb character towards the south. One of the leading characteristics of the belt is its intersection by broad river valleys themselves serrated by the constantly changing courses, old and new, of shifting streams, which are at intervals fed from smaller river courses falling into them from either side. The main difference between the river system here and in the Sub-Himalayan tract is that water runs through broader and less contracted beds in the former than in the latter. The shallowness of the river channels and the wide extent of arable land on either side of them leads to an extensive use of dams and to various arrangements between zamindars and cultivators for distributing the cost of utilising river water.

Subsoil water has now become further from the surface, and is generally not found at a less distance than 10 to 15 feet, but on account of the decreasing humidity of soil and atmosphere wells are far more abundantly used than in the sub-Himalayan tracts. It is necessary, however, to divide the Rohilkhand and Ganges-Gogra belt into two sections for the following reasons:—The soil is sandier and less consistent in the west than in the east, and tanks and wells are, therefore, more easily maintained in the latter than in the former. Partly owing to this cause, partly to the greater value of the stiffer soil (which makes irrigation pay better), partly to the more forward condition (owing to historical causes) of the eastern districts, means of irrigation exist to a much higher extent in the east than in the west, notwithstanding that climatic conditions and produce are similar. Rice, sugar, and spring cereals are predominating crops in both. The difference in irrigation (gauged by a reference to the figures for the lower

* The climate is much like that of most parts of Oudh and Rohilkhand, drier than that of lower Bengal, but moister than that of the Doáb; and the country throughout the year, except in the months of May and June (till the rains come on), has some pretensions to looking green and fresh, and is not brown and parched like the Doáb. It is quite an exception for two full months to pass at any time of the year without some rain, and usually the winter rains are pretty regular and copious about Christmas time, or during the first fortnight in January.

The Settlement Officer of Azamgarh writes:—
"There are numerous swamps which are dry, or nearly so, during the hot season, but in the rainy season they spread over considerable areas. Much of the land along their edges and within reach of them is then under rice cultivation, and beyond the depth at which cultivated rice can grow there is generally a broader or narrower fringe of rushes (*narai*) and wild rice (*tinai*)."

tracts of Budaun, Sháhjahánpur, and Bareilly, and to those for Jaunpur and Azamgarh) is that in the former about one-half, and in the latter very nearly three-fourths is irrigated; and while in the former hardly a masonry well exists, in the latter they are very numerous. It is also the case that earthen wells are often more stable in the east than in the west, where they seldom last more than one year.

III.—DOÁB BELT.

The two portions of the Doáb belt differ (as elsewhere explained) in the large proportion of sand in the west (IIIA.) and in the prevalence of saline efflorescence in the east (IIIB.) Both are traversed by canals as far as Cawnpore, irrigation from which covers nearly one-eighth of the cultivated area of the districts from Saháranpur to Cawnpore. Wells are more easily maintained in the east than the west (for the same reason that reh is more easily collected and retained), namely, because soils are on the whole firmer and less permeable.

The following brief description is given of a central tract (North Cawnpore) in the lower Doáb country in Mr. Buck's note on reh* :—

"The main stratum of the country is a light soil containing a good deal of silica. It is intersected by a succession of small rivers, more or less parallel, which flow in a slanting direction into the great rivers, the Ganges and the Jumna. They are usually flanked on each side by an undulating strip of varying width which the drainage has cut up and rendered sandy. But between each pair of rivers, and skirted by the sandy strips, is a depressed table-land of some few miles in width in which the soil is principally loam, and which is full of lakes or jhils and reh-infected tracts, which lakes themselves form the source of a new or intermediate stream. Sometimes, as I proved by the persistent examination of earthen wells over a tract 400 or 500 square miles in extent, the loam stratum is very shallow, a mere veneer as it were above the more sandy stratum, and sometimes it disappears entirely or alternates with patches of sand, but on the whole loam, becoming clayey in depressions, is the prevalent soil."

Towards the north-west, i.e., as we approach belt IIIA., loam becomes less and less prevalent, and extensive tracts of light brown sand begin to appear more and more frequently in which irrigation of any kind is both difficult and unremunerative. Such is the class of land which (as explained elsewhere) chiefly gives rise to the large per-centage of the cultivable margin (not cultivated) in the districts of belt IIIA. Wells, although more easily maintained in the east, are, however, practicable in most parts of the Doáb, whether in IIIA. or in IIIB.; but wherever the Ganges or Jumna is approached the water level sinks until it often occurs that water cannot be found

* Compare Mr. Evans' report of Farukhabad :—

Description of the Minor Doábs.—"The general physical features of these tracts between pairs of rivers are described by Mr. Elliott. First we have at each limit north and south the alluvial beds, i.e., the strip of land lying between the sandy slopes leading down to the river beds and the rivers themselves, and year by year more or less flooded by the rivers in the rains. Passing inwards are two sandy tracts rising from the basins of the rivers, the outer edge cut up by ravines which carry off the drainage of the country. These gradually become more level as one passes onwards. At the same time the soil also gradually changes, becoming firmer and less sandy by degrees, until after a while a loamy soil called dumat appears; no distinct boundary line between the two being generally perceptible. This dumat tract forms the central watershed of the Doab, and along the central line of it lie reh plains and the lakes that accompany them, when the cultivation, instead of being continuous, lies in patches of various sizes like islands in the usar. These central dumat strips may be said, roughly speaking, to be the irrigated portion of the district. In them wells are made with little difficulty and expense; they require little or no artificial assistance, such as is afforded by wattle coils or wooden or masonry frames, and last for a considerable time. In the sandy tracts wells either cannot be sunk at all, or last but a year or two, unless built up with masonry from the spring level."

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nearer than 60 or 70 feet, and well irrigation becomes too expensive to use except on the very best land. The same circumstance happens to a smaller degree in the marginal land of the streams feeding the two large rivers, where not only is water further from the surface than in the central tracts, but substrata are more sandy and shifting, making the maintenance of wells more difficult than in the middle strips, where water is nearer. It is also the case that, owing to the greater depth at which water is found throughout the Doáb as compared with the north Ganges country, a greater variety of strata have to be pierced before water is reached in the former than in the latter, and it may therefore be easily understood that localities frequently occur where the substrata are so loose that earthen excavations will not stand. The consequence is that tracts fully protected and tracts not protected at all are dovetailed together somewhat promiscuously.

It is unfortunate, however, that canals and canal branches, led as they must be along water-sheds, follow the very lines which in the Central Doáb at least are best suited for wells, a circumstance proved by the small gain in revenue "due to canal" in the Central Doáb districts (land formerly "well" irrigated being classed as giving no revenue to canal).

"Other sources," i.e., tanks, jhils, and rivers, form a very small portion of the irrigation in the Doáb. The dryness and greater permeability of the soil, which, even when loam or clay above, is usually sandy under the surface, will not allow of the retention of water to any very serviceable extent, and what irrigation is derived from collected rainfall is confined chiefly to the series of shallow lakes or ponds in the central depressions (described in the note above quoted), from which water is lifted for rice or for the irrigation of young cereal crops in the first month or two after the rains; artificial tanks are so unusual that their existence as an irrigating factor may be ignored, while river water is very little used on account of the depth of water below the cliffs and the small width of the alluvial beds which are within irrigating reach.

Crops in IIIA. differ from those in IIIB. in that the former grows more sugar and wheat and less cotton and indigo. Cotton and indigo are, however, grown in the lower part of IIIA., and the upper part of IIIB. to a greater extent than in the extreme north-west, or than in the extreme south-east of the belt. In the latter indigo is stopped by the absence of canal irrigation, for it must be noted that indigo cannot, as in Bengal, be grown without water in the North-Western Provinces, and in the former cotton is subject to too heavy rainfall.

IV.—SOUTH JUMNA BELT.

The south belt is marked by decreasing rainfall and increasing depth to water. Soils are poor, and produce on account of the dryness of the atmosphere as well as of the want of humidity in the ground, is subject to great oscillations. The only exception is the black soil formation which runs through Bundelkhand, and which is tenacious of moisture, but at the same time almost impracticable under irrigation. The crops grown are in the autumn chiefly cotton with the millets and pulses, and in the winter gram and oil seeds are more common than in most districts north of the Jumna. Water lies at great depths, very often below 50 feet. In the tracts of Muttra and Agra, cultivated as they are to a great extent by the industrious Jat community, masonry wells are numerous, and large areas fully watered, but in the similar tracts of Jalaun, Hamírpur, and Bánda wells for irrigation are almost unknown.

Physical Changes from West to East.

The synopsis which has been sketched in the preceding paragraphs, indicates in the roughest way the broad outlines of variation with respect to existing

physical conditions which are met with in receding from the Himalayas towards Central India. To sum up the facts in a still briefer abstract it may be said that rainfall and atmospheric moisture decrease, and that subsidence of water below the soil and difficulty of irrigation increase in proportion to distance from the Himalayan Range. It may also be noticed that this decrease in moisture (above and below the soil) is crossed at right angles by steady changes of another kind both in atmosphere and soil, the first of which may be described as the transition from the west to the east wind region, and the second as the transition from sand to loam.

The north-westerly districts, except those close to the Himalayas, have far greater aridity in the dry weather, a fiercer heat in the summer months before the rainfall, and more prolonged cold with a lower temperature in the winter, which circumstances are chiefly due to the prevalence of the dry west wind which blows over them, and which hardly reaches the south-easterly districts. The change is marked by no well-defined limit, but varies in intensity and in position from year to year, and always assumes a more or less gradual character.

The transition from sand to loam is equally difficult to define, for sand and loam tracts are intermixed in a confusing way throughout the central districts of the Doáb; but it may be noticed that large stretches of sand dunes occur in the districts in the neighbourhood of Meerut, which indicate an extensive prevalence of sandy soil, while below Cawnpore the class of "light blown sand," so common in the west, disappears almost completely from the settlement officer's record.

Physical Changes accompanied by Changes in Produce.—The gradual changes of atmosphere and soil in both directions are roughly marked by changes in the character of production. While, for instance, there is no cotton in the belt adjacent to the Himalayas, and little in the penultimate belt, it increases in the Doáb, and rises to a maximum south of the Jumna. Sugar, on the other hand, recedes in the same direction that cotton progresses. So, too, wheat, which likes winter cold and dryness of atmosphere, declines from west to east, while rice increases in importance in the direction in which the stiffer soil and damper winds of the east tend to preserve the moisture which it requires. There are a variety of other cross lights which could (with closer statistics of detail), be clearly mapped and traced to their physical causes, but the above broad shades will sufficiently delineate the leading characteristics which belong to the different quarters of the province, and which bear a very intimate relation to its requirements for irrigation.

Statistical Statements.

(1.) *Character of Uncultivable Land.*—Noticing first the per-centage of cultivable area in each district, it will be found that the per-centage of cultivable area (not cultivated) is as a rule largest in those districts in which sand predominates. Light sand can hardly ever be called absolutely uncultivable, whereas almost all rocky stony soil, and very much of the land impregnated with saline admixtures, are absolutely uncultivable. It has also to be remembered that there is much saline land of which it is impossible to state whether or not it is cultivable, and that in consequence the per-centage of cultivable land allotted by one settlement officer to one district has not the same meaning as the per-centage allotted by another settlement officer in another district.

The uncultivable area in the northern belt consists chiefly (1) of stony undulations or slopes at the foot of the Siwaliks or Himalayas, which occur most prominently in the districts of Saháranpur, Bijnor, and Taráí, in which it will be noticed that the per-centage of uncultivable land is very large, (2) of swamps, and (3) very light sand on the edge of river beds.

The Rohilkhand and Ganges-Gogra belt has on the

whole a very small area of uncultivable land (especially on the side nearest the Himalayan Range), as will be seen by observing the figures for districts which lie either completely or almost completely within it, namely, Bareilly, Budaun, Sháhjánpur, Hardoi, Sitapur, Kheri, Bahraich, Gonda, Basti. The north-west portion of the belt is characterised by broad sandy ridges, lying above and along the wide valleys of the rivers of which some portion is uncultivable; but as the Settlement Officer of Bijnor remarks, "the places are very rare where sand so entirely predominates as to produce this result." There is also a large area of land which is rendered uncultivable by swamps and water lying on the land after the rains. In the south-east portion of the belt now under remark reh appears and renders uncultivable large areas, but not so extensive as those which are made sterile by the same cause in the Doab. The districts affected by reh are those which lie nearest the Ganges from Lucknow to Azamgarh, and to this cause may be attributed the rise in per-centage which occurs in the uncultivable area of those districts, although there is a suspicion that in some of them (and notably in Lucknow, Sultanpur, and Partabgarh) the area of uncultivated land may have been over-estimated.*

In the third or Doáb belt reh is the main cause of sterility. Reh appears to cross the Jumna from the districts north of Delhi on the Punjab side to the districts south of Delhi on the North-Western Provinces side, and, running through the centre of the Doáb as far as Allahabad, seems to find its way across the Ganges into Oudh, somewhere to the west of Lucknow, on the east of which district most of the country between the Ganges and the Gogra is affected by it, but, as observed, not so seriously as the Doáb. Reh is described by the Settlement Officer of Etáwah as appearing on "level plains from which water cannot escape." This is true, and it occurs more especially in the drainage basins (often several square miles in extent), from which the small river feeders of the Jumna and the Ganges take their rise. It is a noteworthy fact that in this region, i.e., the Doáb belt, the water level, except near the Ganges, is from 20 to 30 feet below the surface, and it is probable therefore that there may be some connection between the conditions of humidity in the air and the soil and the appearance of reh at the surface of the district which lie in it. In the report on reh lately submitted to the Government of the North-Western Provinces and Oudh it was generally agreed that desiccation of atmosphere combined with a certain amount of moisture in the soil are necessary to produce that amount of evaporation which is sufficient to bring reh above ground. It is certain that in the Sub-Himalayan belt, where water is near the surface, and the atmosphere damp, and in the south belt, where water is distant and the air extremely dry, reh is practically absent. Whatever may be the case, however, the per-centage of uncultivable area in reh-infected districts is very large, rising in the Central Doáb to more than 30 per cent.

Passing now to the south-west belt, uncultivable

* There is no reason to believe that Rae Bareilly, which has over 17 per cent., and Jaunpur, which has only 10 per cent. of uncultivable land, are essentially different in character from the districts which lie between them, in which the per-centage is recorded as 24 and 30 per cent.

1. We come next to the question of the manner in which the cultivated area is sub-divided, i.e., the crop acreage. And here we are met by the serious imperfection of the record, which makes it impossible as yet to deal with this subject as exhaustively as it deserves. The annual statements which every village accountant is bound to file contain an almost complete account of the agricultural condition of each village. They show the total area, the cultivated area,

area is due mainly to the extensive ravines which skirt the Jumna and some of its feeders, and to the stony undulating ground on the spurs from the Vindhya Range which penetrate the North-Western Provinces on its southernmost frontier from Gwalior to Rewah. Mr. Crosthwaite, the settlement officer of Etáwah, describes some tracts of that district which lie along the Jumna as "wild and inhospitable regions of ravines," terms which may be applied to much of the country on both sides of this river from Agra to Allahabad on the south boundary. The conformation of the hilly tracts in the districts of Jhánsi, Lalitpur, Hamirpur, Pánda, and Mirzapur, assimilates to that of the similar well-known country in Central India, and hardly needs further description.

(2.) *Cultivable Margin.*—The character of the cultivable margin follows very closely that of the uncultivated area: but, as noticed above, the per-centage of the former is as a rule smallest when that of the latter is greatest. The total figures show that about two-fifths of the province are uncultivated, of which, roughly speaking, more than one-half is cultivable.

Much of the cultivable margin, as well as of the uncultivable area, is reh-infected land, which would undoubtedly be brought under cultivation if reh could be eradicated, for it is a well-known fact that some of the best land of the province is that with which reh patches are intermixed. Mainpuri is a typical district, comprising as it does instances of three of the classes of land which have been described. In the north are the sandy tracts which characterise the upper part of the Doáb belt; in the centre the loam reh-infected tracts, which belong to the Central Doáb; in the south the poorer country terminating in ravines, which are included in the South Jumna belt. The following is the description given in a review by Mr. Crosthwaite, when secretary to the Board of Revenue, of the central portion: "This region," he writes, "of which the distinguishing features are the prevalence of reh plains, jhils and marshes, and the wonderful fertility of the land under cultivation, is the garden of the district. From east to west it stretches in one uniform plain of high cultivation, luxuriant crops, and copious irrigation (the Arind runs down its centre, with the Cawnpore and Etáwah branches of the Eastern Ganges Canal on either side), culminating in the Mustafabad pargana, in which every advantage, natural and artificial, are found combined in a remarkable manner. The soil of this tract is principally loam."

A great deal of the cultivable area of the Sub-Himalayan belt, and of the north portion of the penultimate belt, and some portion of that in other belts, is now occupied by forest or grass and is good land, but it is doubtful whether the province would not suffer by the diminution of pasturage which would occur if any material portion of this area were brought under the plough. As it is, the protection of forests has obliged the exclusion of cattle from much of the area in which they were accustomed to graze, and any further curtailment of grazing land is to be deprecated. Another useful service which the cultivable margin performs, especially in the moister belts of the country, is the supply of thatching and fodder grasses which grow abundantly in jhils and marshes prevalent throughout the country between the Jumna and the Himalayan Range, which are more numerous still as the Himalayas are approached.

and the culturable waste. Against each field is recorded the name of the occupant, the area and the crop sown, whether the field is irrigated or not, and if irrigated, from what source it gets its water, the rent due and the rent paid for it—and these figures are totalled up for the entire village. If the village totals were similarly gathered together it would be easy to present to the eye a complete synopsis of the agricultural position of each district and each sub-

division of a district; and if the village returns were scrutinized by a body of competent officers, and a sufficient per-centage of them tested from time to time on the spot, and the entries compared with the actual facts, a high degree of accuracy would be obtained, and the general results would be worthy of entire confidence. Unfortunately several circumstances have combined to mar the seeming completeness of this scheme. In the first place, part of the North-Western Provinces (known as the Benares Province) is permanently settled; and in these districts there has been of late years no such careful field survey as is essential to provide the first data for agricultural statistics. Fields have altered in shape and size, and new land has been brought under cultivation, to such an extent that the old records are no longer trustworthy. In the second place, no sustained and combined effort was made to utilize the village records by totalling the figures up for districts until the new Agricultural Department was created for the North-Western Provinces in 1874; and though great progress has been made under that department, it has not yet succeeded in carrying out its main object in all districts of the North-Western Provinces, whilst its operations have not yet extended to Oudh. Mr. Buck has also already explained how the drought of 1877 disorganised his department, necessitating the diversion of the attention of officers to more immediately pressing subjects. There are, therefore, four classes of districts in the province: (1), the permanently-settled districts, as to which the total cultivated areas are very doubtful, and the detailed crop areas altogether unknown; (2), the Oudh districts which have been recently surveyed and settled, and regarding which the areas are therefore pretty accurately known, but the areas under each crop are less correctly recorded, because there has been no definite system of supervising the returns of the village accountants, and abstracting their general results; (3), six districts of the North-Western Provinces in which the Agricultural Department has not yet effected its desired reforms, so that the crop figures cannot be relied on; four of these are Himalayan or sub-montane districts, in which the areas are very large and the staff required for recording the crops is either inadequate or altogether non-existent; (4), twenty-four districts of the North-Western Provinces, into which the new system of the Agricultural Department has been definitely introduced, and the figures abstracted from the village returns are fairly trustworthy, though even here, as experience is gained and as supervision is more active, improvement is to be expected. It is proposed, therefore, in this reply, firstly, to give in full detail the crop areas for the 24 districts, so as to show what conclusions may be drawn from them, and then to apply the same ratios to the cultivated area of the entire province.

2. Before proceeding further, it may be as well to mention here the two great difficulties in the way of securing accurate crop statistics in Upper India. One of these is the habit of double-cropping. If all the land bore only one crop a year it would be sufficient to go over it once and to record the crop on it or just taken off it, and the total area under crops would agree with the total cultivated area. But where land is rich and highly manured, two and sometimes three crops are taken off it in the year; and to record these requires frequent visits and greater care, and it is necessary to bear in mind, what is often forgotten, that the cropped area should always be larger than the cultivated area. The second source of difficulty is the extraordinary extent to which mixed crops are grown. This habit makes the record confused and lengthy to a degree which can hardly be conceived. To give an example, a statement of the crops grown in the Moradabad District has been examined, with the result that, though the main kinds of articles are but 23, the combinations in which they can be grown with non-food grains and with each other amount to as many as 243. This enormously increases the difficulty of classifying the crops; and it is impossible to

do it with perfect accuracy, since the proportion borne to the whole by each item in the mixed crop cannot be known, though a fairly approximate estimate may be formed.

3. The rate of produce per acre assumed as the average of each of the 24 districts will be found in the appendix.* The data on which these assumptions are made are as yet somewhat tentative, and no great degree of accuracy can at present be claimed for them. The main basis for the figures assumed has been obtained (1) by taking the estimates made by the different settlement officers while engaged in assessing the districts, during which time it has been very common to make experiments by cutting and weighing the produce of selected fields; (2) by comparing these figures with each other, and using them to modify each other, wherever, for example, there was much difference in the estimates for two adjacent districts with similar soils and system of cultivation; (3) by testing the general result by means of the requirements of the district. It may be taken as an axiom that the whole province produces on an average a little more food than its population ordinarily consumes. There is always more export than import of food. And the same rule applies, with very few exceptions, to each component part of the province—that is to each district. Large towns cause an exception to the rule, especially when the district in which they stand is small, as is the case with Benares. Another exception might be found in the case of a district largely given up to growing non-food crops which purchases part of its food from elsewhere. But this is not believed to be the case in any part of the North-Western Provinces, though the Rohilkhand districts come nearest to it. Growing an unusual quantity of sugarcane, their out-turn of food grain comes closer to the actual need of the population than elsewhere; and Rohilkhand does frequently import food grains whenever it suffers from a short crop, paying for them by the price of its sugar. On the whole, however, this rule holds good, and it affords a sound general test of the accuracy of any calculation of average out-turn, since none can be correct which does not result in a figure slightly exceeding consumption.

4. *External Trade of the Province.*—An assertion such as this might probably be made in safety, in reliance on the known facts of the province and the general experience and consent of the officers engaged in the administration. It should, however, be capable of further demonstration by provincial trade statistics, if these had been kept up as long and supervised as carefully as has been the case in the Punjab and the Central Provinces. This, however, has not been done in the North-Western Provinces. Indeed, no statistics at all had been collected till it was decided in 1875 to establish a system corresponding to that of the adjoining province, by keeping up registering posts on the chief lines of communication. The year 1877-78 was the first year during which this system was fully at work; and it has now been decided by the orders of the Secretary of State that the system should be abolished. Short, however, as the period has been, the statistics collected have furnished some useful information. It will not be overlooked that 1877-78 was an altogether abnormal year. The kharif crop failed almost totally, and hence there was a net import of grain instead of a net export to supply the deficiency. Cotton also, and sugar, which are the products of that crop, were produced in much smaller quantities than usual; and trade was slack throughout the year, as the purchasing power of the people was much reduced. The following statement shows in abstract form what is furnished in greater detail in Mr. Buck's two annual reports, the net exports or imports of the main articles of commerce:—

* Statement No. 2.

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Articles.	1877-78.		1878-79.	
	Net Imports.	Net Exports.	Net Imports.	Net Exports.
Cotton	84	—	—	153
Piece goods	102	—	519	—
Drugs	13	—	15	—
Dyes	—	11	—	23
Wheat	—	359	—	2,238
Other grains	8,183	—	—	2,271
Lac	11	—	—	—
Metals	417	—	775	—
Oil seed	—	3,450	—	6,221
Opium	—	129	—	91
Ghi	—	77	—	141
Salt	1,561	—	2,384	—
Saltpetre	—	7	—	—
Spices	21	—	46	—
Stone	145	—	—	—
Sugar, refined	—	722	—	476
unrefined	—	873	—	1,654
Tea	—	1	—	—
Tobacco	—	49	9	—

Note.—The figures are in maunds, 000's omitted.

As far as it is possible to draw any conclusions from the figures of only two years, one of them an exceptionally bad one, they should apparently be these. The normal imports of the country are piece goods, drugs, metals, salt, spices, and stone. Cotton was imported in 1877-78, because of the failure of the crop that year; but in 1878-79 the crop was an ordinary one, and it resumed its place among the exports.

The chief normal exports are wheat and other food grains, ghi, oil seeds, sugar, opium, and indigo. With regard to tobacco it is difficult to say what the facts are; but the general impression seems to be that the province, as a rule, consumes a little more tobacco than it grows, and does not ordinarily export, though it did so in 1877-78. How much the ordinary course and balance of trade were affected by the drought of 1877 is seen from the fact that in 1876-77 the North-Western Provinces exported by rail alone net 210,000 tons of wheat or 5,880,000 maunds, while in 1877-78 the net export was only a sixteenth of this, and was counterpoised by a very large import of inferior grains.

The trade of the province during 1878-79 with its neighbours was valued at—

	Rs.
Imports	7,05,63,000
Exports	8,80,75,000

leaving a slight balance in favour of exports, while the trade with foreign countries through the ports of Bombay and Calcutta was valued at—

	Rs.
Imports	5,64,29,000
Exports	11,13,96,000

leaving a balance of Rs. 5,49,67,000 in favour of the exports.

5. Having then obtained this general view as to the extent to which the producing powers of the province fall short of or exceed the requirements of its inhabitants, the next step is to consider what those requirements are.

As to the amount required for human food, the data for the calculation are as follows. The North-Western Provinces jail ration for adult prisoners confined for periods not exceeding three months, and doing light labour, is $1\frac{1}{2}$ lbs. of the flour of the coarser millets or $1\frac{1}{4}$ lbs. of the flour of cereals. Making allowance for children who require half this ration, and for the loss in grinding, this may be taken as equivalent to $1\frac{1}{4}$ lbs. of grain per head per diem, or $5\frac{3}{4}$ maunds per annum. This precisely agrees with the quantity assumed as necessary in the Punjab, Bombay, and Madras; and is a little in excess of the estimate made in the Central Provinces and Berar, where 5 maunds is believed to be sufficient. It seems, therefore, advisable to estimate the food consumption at $5\frac{3}{4}$ maunds per head per annum, which is a little more than a ton of food to every five persons. The municipal estimate of consumption in towns is 7 maunds per head, but this would be too high for an estimate of the food of the rural population.

For seed grain the following estimate has been made, on the basis of the reports of several settlement officers and of the experience gained by the agricultural department:—

Wheat	-	80 lbs. per acre.
Barley	-	70 " "
Gram	-	40 " "
Joar and bajra	-	10 " "
Rice	-	60 " " (i.e., 90 lbs of paddy.)
Maize	-	30 " "
Smaller millets and pulses	-	20 " "

For the loss by dryage after the grain is harvested, and by waste during the time it is stored, it is probably safe to estimate 5 per cent. of the gross produce.

The food consumed by cattle is the item regarding which least information exists. There is no regular return made of the number of cattle, as in the Punjab; and though many settlement officers took a census of them at the time of the survey the result was not very trustworthy. The plough bullocks alone, reckoning 8 acres to a yoke, must be 6 million in the North-Western Provinces with its 25 million cultivated acres; and this implies probably a total number of 12 to 15 million cattle, including cart bullocks, cows, calves, and heifers and buffaloes. Mr. Buck, arguing from a special census taken by himself in a small area, reckons the number of cattle as high as 20 millions, and estimates their food at $7\frac{1}{2}$ million maunds. In the Punjab the total number of cattle is calculated as 6 millions (which is probably too low); and their food at 6 millions of maunds. In answer to a special inquiry made from district officers, a set of replies have been received according to which every plough bullock gets a seer of grain a day while ploughing (say four months) and the same while working at the well (say four months), or 6 maunds a year, which is more than the human population consumes. Such an estimate cannot be correct; but there is little doubt that the people seldom give their bullocks as much grain as they would like to give if they could afford it. Much food is given in the form of green fodder, besides the dry fodder and cotton seed which they habitually get. Probably 2 maunds a year of food grain would be a full calculation of what they receive on an average from rich and poor owners taken together. This would amount to 12 million maunds for the North-Western Provinces. Adding in something for cart bullocks (who always get grain while they are worked) and for milch cattle, I propose to calculate the consumption of food grain at 18 millions of maunds, or $\frac{3}{4}$ of a maund to each acre.

6. It is possible now after clearing the way by these preliminary remarks to estimate what the requirements of these 24 districts are, and what the amount of food grain is which on the hypothesis already stated must be produced by the food-growing area in these districts, so that any estimate of out-turn which should fall below this would be *ipso facto* condemned as incredible:—

	Mds.	Tons.
Population 20,530,000 at $5\frac{3}{4}$ maunds	1,18,047,000	4,216,000
Cattle food at $\frac{3}{4}$ maund per acre on 19,208,000 acres	14,406,000	514,500
Seed grain at rates above stated	9,401,000	336,000
Wastage at 5 per cent. (say)	7,500,000	268,000
	1,49,354,000	5,334,500

The average out-turn of food grains in these districts must necessarily be a little larger than this, in order to allow for the small amount of export that goes on,

and for years that fall below the average. But it should not be much larger than this quantity; or else there would either be a rapidly accumulating store of grain in the country, or a larger export than is believed to exist would be required to carry it off.

7. The following table shows the abstract of the calculation made, the details of which for each district are entered in the appendix.* The district rates have

been worked out, as already explained, by combining three different sets of considerations,—the estimates and conclusions arrived at by settlement and district officers; the principal that the assumed rates of adjacent districts ought to correspond to the known relative fertility of those districts; and the principle that such a result must be worked out as to show that every district is quite or nearly self-supporting.

STATISTICS of 24 DISTRICTS in the NORTH-WESTERN PROVINCES.

Food Crops.	Area, in Acres.	Produce in Maunds per Acre.	Total Out-turn, in Maunds.	Non-Food Crops.	Area, in Acres.	Value per Acre.	Total Value.
Wheat	3,145	11.01	34,645	Sugar-cane	477.6	Rs. 80	Rs. 38,108
Barley	940	10.18	9,576.5	Cotton	456	20	9,120
Gram	1,281	8.37	10,718.5	Cotton with arhar	807.6	10	8,076
Peas	103.6	5.97	615.6	Fibres	64	20	1,280
Wheat, mixed	1,917	9.35	17,930	Indigo	192.6	20	3,852
Barley, "	1,525	9.57	14,596	Fodder	390.2	20	7,804
Jowar	2,600	7.29	18,964	Potatoes	15.5	100	1,550
Bajra	1,758	6.35	11,163	Garden crops	179	30	5,370
Rice	1,309	11.19	14,654	Tobacco	32.1	50	1,605
Maize	442	11.33	5,009	Opium	67	50	3,350
Pulses	656	7.00	7,987	Oil seeds	311.3	20	6,226
Small millets	428.5	5.5	2,356.5	Miscellaneous	53.5	20	1,070
Miscellaneous	56.5	5.00	2,825				
Arhar mixed with cotton	—	5.00	4,038				
Total	16,161.6	9.20	149,896.6	Total	3,046.4	28.7	87,411

* Three 0's omitted.

These figures lead to the conclusion that in these 24 districts the average out-turn of food grain is 9 maunds $9\frac{1}{2}$ seers or 739 lbs., or about $6\frac{1}{2}$ cwt. per acre; that there is one person to every 787 acres growing food grains and to every 935 acres bearing crops; that about 78.8 per cent. of the average food out-turn is required for the consumption of the people; about 21 is required for seed and food of cattle or lost by wastage and dryage, and about 1.3 per cent. remains over for export. So far the figures seem to be tolerably consistent with the facts, though the margin is probably smaller than the truth; and this may be accounted for by supposing either that the produce per acre is underrated, or else the double-cropped area is less than it should be.

8. With regard to the non-food crops, however, the result is not so satisfactory; and it appears impossible at present to make the estimate of consumption agree with the estimate of requirements. It has been seen from the trade statistics, imperfect as they are, that there is reason to believe that the province usually imports spices and tobacco but not cotton, though it did so in 1877-78; and that it certainly exports dyes, oil seeds, ghi, opium, and sugar. The agricultural statistics ought therefore, if they are to support the trade statistics, to show a deficit in the production of the one class of articles and a surplus in the production of the other. It does not, however, necessarily follow that the same result should take place in each district, or even in the entire area of the 24 districts. It is more customary to interchange articles of luxury than of necessity; and it has already been pointed out to what extent certain products, such as sugar-cane and cotton, are abundant in certain parts of the province and deficient in others. But, after making due allowance for this, there ought in so large a tract as this to be a tolerable approximation between production and consumption in the case of most articles, subject to the general conclusions drawn from the trade statistics.

It is necessary, therefore, to take each article in succession, and to frame an estimate of the requirements of the people and of the out-turn from the recorded area. In framing the former part of the calculation, the best guide is the estimate made by the North-Western Provinces Government of consump-

tion in municipal towns. This was originally based on the octroi returns, and has been revised and checked during many years, so that it may now be accepted as tolerably correct; subject only to the proviso that in applying it to the wants of the rural population it is sure to be too high, since they do not consume luxuries to the same extent as townspeople.

I. Sugar.—The urban consumption is 30 lbs. of coarse and 10 to 12 lbs. of fine sugar a year, which is equivalent to about three times its weight in coarse sugar. Villagers do not buy much fine sugar, but in the cane districts (especially Rohilkhand) they consume a great deal in the course of manufacture. Taking 30 lbs. a head for the rural and 60 lbs. for the urban population (one-tenth of the whole), the requirements are—

Rural	-	18½ millions at 30 lbs.	555 million lbs.
Urban	-	2 " " 60 " "	" "
Total	-		675 " "

The produce of the best sugar-cane land in Shah-jahanpur was estimated by Mr. Butt at 55 maunds per acre, but this is much above the average. Taking it at 30 maunds all round,* or 2,400 lbs. per acre, the out-turn of 477,600 acres is 1,146 million lbs., leaving a surplus of 371 million lbs., or over $4\frac{1}{2}$ million maunds, which is probably too high. The export of both 1875-78 and 1878-79 was, as has been seen before, about 3 million maunds from the whole province; but the period was one of unusually low production.

II. Cotton.—The best estimate made of cotton consumption is that by Raja Lachman Singh, of Bulandshahr, who puts it at 3 lbs. 10 ozs. per head of the rural population. Raising this slightly to allow for waste and for the urban population, we may reckon it at 4 lbs., or 82 million lbs. for the whole population of the 24 districts. The cotton-growing land is divided into two classes—that which grows cotton only, and that which grows cotton mixed with other crops, especially arhar. The first class produces on the best lands about 2 maunds an acre, say about $1\frac{1}{2}$ as an average. Where it is mixed with other crops, the

* The average wholesale price is about Rs. 3 a maund, or a little less; hence the value per acre has been calculated at Rs. 80.

* Statement No. III.

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amount of mixture varies extremely, and only a rough estimate can be formed by which it may be put at $\frac{3}{4}$ of a maund. The out-turn will then be 1,286,000 maunds or 103 million lbs. This provides a surplus of 21 million lbs., and it has been seen that the province as a whole exported 12 $\frac{1}{4}$ million lbs. or 153,000 maunds in 1878-79. If this amount of export is normal the production must be larger than my estimate, since these 24 districts contain almost all the chief cotton-producing area, while Oudh and the remaining part of the North-Western Provinces grow very little of this staple.

III. Tobacco.—The municipal estimate of consumption is 8 lbs. a head; but this is probably much too high for the villages and agriculturists. The Punjab estimate is 4 lbs., which is perhaps as low as we can reasonably go; and at this rate the consumption would be 82 million lbs. In order to produce this the 32,100 acres recorded as being under tobacco must turn out 2,700 lbs. per acre, which is certainly more than is the case. And yet the province as a whole exported in 1877-78 over 4 million lbs. The only two conclusions possible are—either that the rest of the North-Western Provinces and Oudh produce much more tobacco than the 24 districts of which we have statistics; or else that the area under tobacco is much underrated.

V. Garden crops.—The same difficulty exists in the case of vegetables. The jail ration is 6 ozs. of vegetables daily for an adult, or, say 4 ozs. a head for all classes, or 90 lbs. a year. At this rate the 20 $\frac{1}{2}$ millions require 1,845 million lbs., or 23 million maunds, to provide which the 194,500 acres under garden crops and potatoes must produce about 130 maunds per acre. But the estimate of production made by Mr. Buck is only 100 maunds for potatoes and 50 maunds for other crops, which gives an out-turn of only 10 $\frac{1}{2}$ million maunds. There is probably a combination of errors here. The area may be understated, and the estimate of produce per acre may be too low. On the other hand, it is probable that the poorer classes eat very much less of garden vegetables, and supply the deficiency in their diet by picking leaves of wild herbs and by undergrowths which are not included in the statistics of crop acreage.

VI. Spices.—The estimate of municipal consumption is 12 lbs. a head. Mr. Thornton's figure for Punjab agriculturists is 4 $\frac{1}{2}$ lbs. Taking the lowest estimate, the 20 $\frac{1}{2}$ millions require 1,089,000 maunds, and there is no area specially recorded as being under these crops. Many of these are grown in "garden land," the area of which has been shown to be insufficient to account for the requisite weight of vegetables, supposing no part to be devoted to spices. A portion of the spices are probably grown in the "miscellaneous" area; but the statistics are clearly defective under this head.

VII. Oil Seeds.—The consumption of oil in municipalities is 9 lbs. per head; in villages it is probably less, say, 8 lbs.; and 8 lbs. of oil represents, roughly, 32 lbs. of oil seeds. For 20 $\frac{1}{2}$ millions we require then 656 million lbs., or 8,200,000 maunds of oil seeds. The province, as a whole, exported in 1877-78 3 $\frac{1}{2}$ million maunds and in 1878-79 6 $\frac{1}{2}$ millions. To produce the former figure alone on 311,300 acres the average out-turn per acre must be 26 maunds, which is far too large. There is little doubt that the true explanation of this discrepancy is that oil seeds are grown to a great extent as a mixed

subordinate crop with wheat and barley as well as with cotton and joar; and Mr. Buck has reckoned that in a good year the rent of an acre of wheat, say Rs. 6, is paid by the mustard thrown in with the wheat, which must therefore produce about 2 $\frac{1}{2}$ maunds of oil seeds.

10. The result of these considerations is to show that a great deal remains to be done by the Agricultural Department of the North-Western Provinces and Oudh before we can claim to have reduced our knowledge on these subjects to anything like exactitude. The points that especially require attention are (1) the amount of grain given to cattle; (2) the extent to which double cropping goes on; (3) the extent to which the admixture of subordinate grains and undergrowths increases the food supply of the people; (4) the consumption by the people of supplementary articles of diet, such as sugar, tobacco, vegetables, and spices; (5) the more correct classification of the highly cultivated garden crops.

11. After making all these admissions, it will be readily understood that we do not profess to be able to present any very accurate synopsis of the results of the whole agricultural industry of the province. All that can be done at present in this direction is to prepare what may be called a rough working hypothesis, which may serve to direct attention to the problems that have to be solved and to invite assistance in procuring the necessary data. With this explanation, however, it may be useful to draw up an abstract sketch of this description, by assuming that we can apply to the whole province the data and ratios which have been used with regard to the 24 districts alone.

12. The total cultivated area of the 33 districts of the North-Western Provinces (excluding the Kumaun and Garhwál districts in the Himalayas and the part of Dehra Dun which also lies in the Himalayas) is 25,344,000 acres; and taking the same ratio for double-cropped land as was found to exist in the 24 districts, or 7 per cent., the total cropped area is 27,109,000 acres. Of this (still using the ratios of the 24 districts, or 85 and 15 per cent. respectively), the area under food crops is 23,052,000 acres and under non-food crops 4,057 acres. The Oudh figures, though they do not give crop areas, are more accurate than those of the permanently settled districts of the North-Western Provinces, and they exhibit variations such as might be expected from the fact that the population is somewhat denser, the total cultivated area being 8,299,000 acres to a population of 12 millions, or nearly 1 $\frac{1}{2}$ persons to each acre. The "dofasli" or double-cropped area is 9.1 per cent. instead of 7, and the area under food crops is larger, 87 instead of 85 per cent.—a proof that the population presses more closely on the soil for its food supply. The total area of the whole province is then as follows:—

	Acres.
Cultivated area	25,344,000
Double-cropped area	2,523,000
Total cropped area	36,166,000
Food crops	30,933,000
Non-food crops	5,233,000

Assuming then that on the area sown with food and non-food crops the different kinds of crops are grown in the same ratio to each other and cover the same proportionate area as in the 24 districts, of which we have more accurate statistics, we work out the following table:—

STATISTICS OF NORTH-WESTERN PROVINCES AND OUDH.

CHAP. I. Q.

NORTH-
WESTERN
PROVINCES
AND OUDH.

Mr. Elliott.

Food Crops.	Area in Acres.	Produce in Maunds per Acre.	Total Out-turn in Maunds.	Non-food Crops.	Area in Acres.	Value per Acre.	Total Value.
Wheat	6,019.7	11.01	66,276.9	Sugar-cane	820.5	Rs. 80	Rs. 65,640
Barley	1,799.2	10.18	18,315.8	Cotton	783.9	20	15,678
Gram	2,451.9	8.37	20,522.4	Cotton with arnar	1387.6	10	13,876
Peas	198.3	5.97	1,183.8	Fibres	109.9	20	2,198
Wheat, mixed	3,669.2	9.35	34,307	Indigo	331.2	20	6,624
Barley, "	2,918.9	9.57	27,933.8	Podder	670	20	13,400
Jowar	4,976.5	7.29	36,278.6	Potatoes	25.7	100	2,570
Bajra	3,364	6.35	21,361.4	Garden crops	307	30	9,210
Rice	2,505.4	11.19	28,035.4	Tobacco	55.9	50	2,795
Maize	846	11.33	9,585.2	Opium	115.6	50	5,780
Pulses	1,251	7.00	8,757	Oil seeds	534.7	20	10,694
Small millets	819	7.00	5,733	Miscellaneous	91	20	1,820
Others	113.9	7.00	797.3				
Arhar mixed	—	5.00	6,938				
Total	30,933.	9.22	286,302.6	Total	5,223	28.7	150,285

(000's omitted).

Requirements.	Mds.
Food of 41,000,000 at 5 $\frac{1}{2}$ maunds	235,750
Seed grain	22,994
Wastage at 5 per cent. of produce	14,220
Cattle food at $\frac{3}{4}$ maund per acre	25,232

Total requirements - 296,196

According to this calculation the province does not provide enough food to meet the requirements of its inhabitants. This we know not to be the case; and therefore it follows that there is an error either in the calculation of consumption or of production. It is possible that the amount consumed has been over-rated, but this is hardly likely, considering the basis on which the calculation is made, and the fact that the average quantity of food grains consumed per head in towns is found to be 7 maunds. The error is more likely to be in the figures on the other side of the account; and it may be either in the area or in the rate of production per acre. I believe it lies in both of these figures. It has already been suggested that the double-cropped area was under estimated in the 24 districts; and probably it is still more underrated in the more thickly populated tracts of Southern Oudh and the Benares Division. The rate of produce per acre is undoubtedly larger there than in the western districts, which included the poor soil of Bundelkhand, and it is not unreasonable to assume that if the general average for those districts is 9 $\frac{1}{2}$ maunds, it should be 10 maunds for the whole province. This would give an out-turn of 309,330,000 maunds, or very slightly in excess of the requirements of the country. A further margin is required to provide for export, and for the fact that even in an average year the season is unfavourable to some crops; and this margin is obtained by assuming that the area cropped twice a year is larger by some 3 or 4 per cent. than has hitherto been supposed. If it is raised from 7 to 10 per cent. the area under food crops would be 31,450,000 acres and the out-turn 314,000,000 maunds, which gives a margin of 18,000,000 maunds, or 650,000 tons.

13. **Average Price of Food Grains.**—In order to define the average price of food grains the table below*

has been compiled: 10 principal markets have been selected (Meerut, Agra, Cawnpore, Bareilly, Lucknow, Fyzabad, Allahabad, Gorakhpur, Benares, Jhansi), and the average monthly price at each of these places has been extracted from the official price currents, and the average of the 12 months has been taken as the yearly average of that place; the average of the yearly figures for the 10 markets has been taken as the average of the province. The price of small millets is not returned in the official price currents, but we shall be safe in taking them as a little cheaper than joar, say Rs. 40 per ton. With these data the money value of the crop can be calculated thus:—

Article.	Out-turn in Tons.	Rate per Ton.	Value.
Wheat	2,368	Rs. 63.6	Rs. 150,072
Barley	654	45.5	29,634
Wheat and barley mixed	2,223	54.5	120,742
Gram and peas	775	52.3	40,445
Jowar and Indian-corn	1,033	48	49,584
Bajra	763	54.5	41,449
Common rice	1,001	80	80,080
Small millets and miscellaneous	233	40	9,320
Pulses	560	63.6	35,440
Total	10,215	54.3	553,906

* 000's omitted.

Taking off 10 per cent. for the difference between market prices and village prices, it may be fairly reckoned that the average price of food grains in the North-Western Provinces and Oudh during the last 10 years has been Rs. 50 per ton.

14. Turning to the non-food crops, the estimates and assumptions made as to the production and consumption of these in paragraph 9 in the case of the 24 districts may be applied to the whole area and population, and thrown into the form of a table, thus:—

*Article.	1869.	1870.	1871.	1872.	1873.	1874.	1875.	1876.	1877.	1878.	Average of 10 years.	Average Rate per Ton.
Wheat	11.7	15.9	21.9	16.5	15.5	16.9	22.5	24.9	16.8	13.4	17.6	Rs. 63.6
Barley	15.2	24.1	30.9	23.3	20.8	22.1	31.4	35.8	24.2	18.1	24.6	45.5
Gram	12.8	15.8	24.8	22.6	20.7	20.2	27.5	33.5	22.7	13.8	21.4	52.3
Jowar	16.3	24.3	27.5	21.2	20.8	20.6	28.9	34.9	23.6	16.3	23.3	48
Bajra	13.5	20.9	24.8	19	18.6	18.4	24.5	32	20.3	13.7	20.5	54.5
Common rice	10.5	13.7	15.8	13.8	13.8	13.2	17.4	19.3	13.3	9.4	14	80
Arhar	11.5	18	23.3	19.1	17.7	13.12	18.4	26	18.14	9	17.6	63.6

ESTIMATE of PRODUCTION and CONSUMPTION of Articles other than FOOD GRAINS for 41,000,000 of People in the NORTH-WESTERN PROVINCES and OUDH.

Articles.	Area sown.	Rate of Production per Acre.	Out-turn.	Rate of Consumption per Head per Acre.	Total Quantity required for Consumption.	Surplus for Export.	Deficit.
	Acres.	Mds.	Mds.	Lbs. Lbs.	Mds.	Mds.	Mds.
Sugar-cane	820,000	20	24,600,000	30 & 60	16,875,000	7,725,000	—
Cotton { unmixed	783,000	1½	2,215,000	4	2,050,000	165,000	—
mixed	1,387,600	¾		4	2,050,000	—	932,000
Tobacco	55,900	20	1,118,900	90	46,125,000	—	25,163,000
Garden vegetables	332,700	60	19,962,000	4½	2,177,000	—	2,177,000
Spices	—	—	—	32	16,400,000	—	11,053,000
Oil seeds	534,700	10	5,347,003	4½	2,177,000	—	—
Ghi	—	—	—	15	7,687,000	—	—
Milk	—	—	—	—	—	—	—

With regard to sugar-cane and cotton there is nothing unlikely in the results thus presented. We know that there is a very large export of sugar, though it can hardly amount to 7,725,000 maunds or 280,000 tons; and there is probably a slight export of cotton. But the figures which show a large deficit in tobacco, vegetables, spices, and oil seeds cannot be believed. There may be a small import of tobacco from Behar, but that is not certain. In the case of vegetables it is probable that the average amount consumed is overrated and should be cut down to two-thirds, or 60 lbs., while the production must be raised to 30½ million maunds to balance even this reduced quantity. Of spices we have no figures, but probably they are for the most part grown at home. Oil seeds we know to be exported to the extent of 5 to 6 million maunds, so the actual production must be over 20 million maunds, or 700,000 tons. Ghi we export to some small extent, so the production must be about 2,250,000 maunds; and milk must be locally produced to the extent of popular need. These two items were not referred to before. The assumed rates are adopted from Mr. Thornton's Punjab estimate, and are probably not above the truth. In the case of ghi the consumption in municipal towns is found to be over 8 lbs. per head, so that the present estimate of 4 lbs. cannot be considered excessive.

15. It is possible now to frame from the data arrived at a hypothetical statement of the agricultural produce of the country, and of its value.

Produce.	Maunds.	Tons.	Rate.	Value.
			Rs.	Rs.*
Food grains	3,14,500	11,232	50 per ton	5,61,600
Sugar	24,600	880	3 per md.	22,150
Cotton	2,215	80	10	73,800
Tobacco	2,050	73	2½	5,125
Vegetables	30,750	1,700	3	30,750
Spices	2,177	77	6	13,062
Oil seeds	19,800	700	2½	49,500
Ghi	2,250	80	20	45,000
Milk	7,687	275	2	15,374
Fibres	220	8	8	1,760
Opium	—	—	50 per acre	5,780
Indigo	—	—	20	6,624
Total	—	—	—	8,30,525

* 000's omitted.

The land revenue payable by the entire province is Rs. 56,675,000, or 6·8 per cent. of the value of the agricultural produce, as estimated above.

16. Although there are so many elements of doubt in this calculation that any conclusion drawn from it can only be suggested as hypothetical and tentative, it still seems worth while to pursue the inquiry one step further, and to complete this branch of the subject by an attempt to show what the condition of the agricultural population is; what portion of the produce they raise from the land is necessary to their support; what the surplus is, and what share of this is demanded by the tax gatherer or remains to the people, to be hoarded up against an evil day or to be expended in luxuries and pleasures.

17. It is a disputed question what is the number of the agricultural population as opposed to the non-agricultural; for there is no sharp division of classes in this respect. Traders and artisans constantly hold a little land, and labourers are employed in field work and other kinds of work as occasion may offer. The question has been discussed in a separate note drawn up in reply to question 8 of chapter I., and the conclusion there arrived at was that the population of the country should be classified as follows:—

Urban and non-agricultural	-	3,800,000
Rural, but following trades and professions alone	-	4,200,000
Rural and following trades or professions conjointly with agriculture	-	4,200,000
Rural and following agriculture only	-	29,750,000
Total	-	41,950,000

The persons then who raise the agricultural products are the two last classes of the population. Agriculture is their main employment and the chief, but not the sole, source of their livelihood, as some of them also add to their means of support from other sources, such as smith's work, weaving, and labouring for hire. For the present, as we are not dealing with the hill districts of Kumaun, Garhwál, or Dehra Dun, we must exclude their population also and deal only with 41 millions of people, of whom the rural and agricultural classes number 33 millions.

18. The production will be the same as in the preceding paragraph, and the consumption of 33 millions will be reckoned at the same rates as were employed before.

Articles.	Total Amount Produced.	Rate of Consumption per Head per Annum.	Total Consumption of 33 millions.	Surplus.	Value of Surplus.
	Mds.	5½ maunds, plus seed grain, cattle food, and wastage.	Mds.	Mds.	Rs.
Food grains	3,14,500		2,45,463	69,037	123,250
Sugar-cane	24,600	30	12,375	12,225	36,675
Cotton	2,215	4	1,650	565	5,650
Tobacco	2,050	4	1,650	400	1,000
Vegetables	30,750	60	21,750	9,000	6,000
Spices	2,177	4½	1,753	424	2,544
Oil seeds	19,800	32	13,200	6,600	15,500
Ghi	2,250	4½	1,753	497	9,910
Milk	7,687	15	6,187	1,500	3,000
Fibres	220	—	—	220	1,760
Opium	—	—	—	—	5,780
Indigo	—	—	—	—	6,624
Total	—	—	—	—	217,723

* 000's omitted.

The surplus produce which remains over after the requirements of the agricultural population have been fully supplied, as far as necessities are concerned, is sold by them to rich traders dwelling in the country,

and to the urban population for their consumption and for export; and the value of it is Rs. 217,723,000. Deducting 10 per cent. from the value assigned to non-food grains (the deduction having already been made from food grains) for the difference between village and town prices, the surplus will be Rs. 208,276,000.

The land revenue paid by the agricultural classes is Rs. 56,675,000, and the local and patwari cesses reckoned at 15 per cent. amount to Rs. 8,501,250, total Rs. 65,176,000. The surplus remaining therefore to the agriculturists to be spent on luxuries and on pleasures is the sum of Rs. 143,100,000, or Rs. 4 a head, or Rs. 20 per agricultural family. Looking at the province broadly, it seems that we may say that the 6½ millions of agricultural families, after providing for their own necessary requirements, such as common food and coarse clothing, and after paying land tax and cesses at the rate of Rs. 10 a piece, have a surplus to fall back on in ordinary years, amounting to Rs. 20 a piece. There are of course great differences among the different sub-divisions of this class. The tenants who pay rent instead of land revenue (rent being about double the land revenue) pay on an average Rs. 20 per family; the agricultural labourers again receive only a wage which hardly exceeds subsistence, and they pay no taxes whatever. Excluding this latter class, the landed population, who may be reckoned at 5 million families, enjoy a surplus of Rs. 26 a piece. It will be a necessary development of the supervision now exercised over agricultural

statistics that in a year or two the department should be able to give the approximate number of landowners who do or do not cultivate land themselves, and of tenants who cultivate without owning land; and when this is known it will be possible to define more strictly the distribution among them of agricultural profits. Some of those who do not own or till land, as well as some of the tenants and even landowners, add to their agricultural surplus some earnings from other quarters by following trades or professions, and there are some minor sources of agricultural profit, such as meat supplied to the towns, leather, timber, and fuel, which have not been included in this account, but which, when added together, form a not immaterial increment to the income of the agricultural population.

19. These calculations represent a very reasonable amount of domestic comfort. A peasantry cannot be said to be ill off which can provide for its own necessities, and after doing this has only to pay 33 per cent. of the surplus in taxes, and is able to reserve the balance, or 66 per cent. to be hoarded or expended in luxuries. At the same time it must again be repeated that I offer these conclusions simply as the best calculations that I can frame from the imperfect data already existing; and that they will be open to revision as soon as the Agricultural Department has brought its statistics into a state of greater coherence and accuracy, a consummation which there is no doubt will, under the present director's guidance, soon be attained.

STATEMENT I.—DETAILS and PER-CENTAGES of TOTAL AREA, in ACRES.

Number.	Districts.	Total Area.	Total Cultivated Area.	Percentage of Cultivated Area to Total Area.	Total Cultivable Area not Cultivated.	Percentage of Cultivable Area to Total Area.	Total Uncultivable Area.	Percentage of Uncultivable Area to Total Area.	General Character of Cultivable and Uncultivable Area.
1.	2.	3.	4.	5.	6.	7.	8.	9.	
NORTH-WESTERN PROVINCES.									
Meerut Division.									
(Dehra Dun—See Hill Tracts).									
1	Saharanpur	1,422	825	58	177	13	420	29	St. O. S.
2	Muzaffarnagar	1,059	700	66	208	20	151	14	S. R.
3	Meerut	1,507	1,059	69	251	17	206	14	S. R.
4	Bulandshahr	1,222	850	70	246	20	126	10	S. O.
5	Aligarh	1,251	950	76	79	6	222	18	S. O.
Total Meerut Division		6,461	4,375	67	961	15	1,125	18	
Rohilkhand Division.									
6	Bijnor	1,196	650	54	290	24	256	22	J. S.
7	Moradabad	1,472	900	61	242	17	330	22	J. S.
8	Bareilly	1,916	1,160	60	427	23	329	17	S. R.
9	Budaun	1,275	840	66	286	22	149	12	S. R.
10	Shahjahanpur	1,116	740	66	197	18	179	16	S. R.
11	Tarai	589	130	22	169	29	290	49	J. S.
Total Rohilkhand Division		7,564	4,420	58	1,611	22	1,533	20	
Agra Division.									
12	Muttra	862	660	76	90	11	112	13	O. St.
13	Agra	1,394	1,050	76	140	10	204	14	O. St.
14	Mainpuri	1,086	608	56	121	11	357	33	S. O.
15	Farukhabad	1,100	670	61	194	18	236	21	S. O.
16	Etawah	1,087	550	51	176	16	361	33	O. St.
17	Etah	968	620	64	157	16	191	20	S. O.
Total Agra Division		6,497	4,158	64	878	13	1,461	23	

* N.B.—The figures in columns 2, 3, 5, and 7 represent thousands.

STATEMENT I.—DETAILS and PER-CENTAGES of TOTAL AREA in ACRES.—*cont.*

Number.	Districts.	Total Area.	Total Cultivated Area.	Per-centage of Cultivated Area to Total Area.	Total Cultivable Area not Cultivated.	Per-centage of Cultivable Area to Total Area.	Total Uncultivable Area.	Per-centage of Uncultivable Area to Total Area.	General Character of Cultivable and Uncultivable Area.
1.		2.	3.	4.	5.	6.	7.	8.	9.
NORTH-WESTERN PROVINCES.— <i>cont.</i>									
(Dehra Dun—See Hill Tracts.)									
Allahabad Division.									
18	Cawnpore	1,496	850	57	166	11	480	32	O. St.
19	Fatehpur	1,044	545	52	127	12	372	36	O. St.
20	Banda	1,895	780	41	702	37	413	22	O. St.
21	Allahabad	1,818	1,030	57	200	11	588	32	O. St.
22	Hamirpur	1,470	750	51	412	28	308	21	J. St.
23	Jaunpur (P. S.)	995	580	58	320	32	95	10	O. R.
Total Allahabad Division		8,718	4,535	52	1,927	22	2,256	26	
Benares Division.									
24	Azamgarh (partly P. S.)	1,567	936	59	201	13	430	28	O. R.
25	Mirzapur (P. S.)	3,345	950	28	1,364	41	1,031	31	St. J.
26	Benares (P. S.)	639	485	76	8	1	146	23	St. J.
27	Gorakhpur	2,934	2,000	68	311	10	623	22	J. R.
28	Basti	1,784	1,250	70	291	16	243	14	J. R.
29	Ghazipur (P. S.)	1,391	990	71	160	11	241	18	O. R.
Total Benares Division		11,660	6,611	57	2,335	20	2,714	23	
Jhansi Division.									
30	Jalaun	995	580	58	195	20	220	22	St. R.
31	Jhansi	1,003	350	35	368	37	285	28	St. R. J.
32	Lalitpur	1,246	242	19	679	54	325	27	St. R. J.
Total Jhansi Division		3,244	1,172	36	1,242	38	830	26	
Hill Division.									
33	Dehra Dun	763	73	9	83	11	607	80	J. St.
34	Kumaun	3,840	327	8	500	13	3,017	78	J. St.
35	Garhwal	3,520	120	3	500	14	2,900	82	J. St.
Total Hill Division		8,123	520	6	1,083	13	6,524	80	
Grand Total North-Western Provinces.		52,267	25,791	49	10,037	19	16,443	32	
Oudh.									
Lucknow Division.									
36	Lucknow	627	332	52	140	23	155	25	O. R.
37	Bara Banki	1,132	718	63	221	20	193	17	O. R.
38	Unao	1,132	596	53	303	27	233	20	O. R.
Total Lucknow Division		2,891	1,646	57	664	23	581	20	
Fyzabad Division.									
39	Fyzabad	1,081	607	56	230	21	244	23	O. R.
40	Bahraich	1,487	810	54	551	37	135	9	J. R.
41	Gonda	1,754	1,070	61	504	29	180	10	J. R.
Total Fyzabad Division		4,322	2,478	57	1,285	30	559	13	
Sitapur Division.									
42	Sitapur	1,417	917	64	321	23	179	13	R. S.
43	Hardoi	1,472	863	59	404	27	205	14	R. S.
44	Kheri	1,511	805	54	558	37	148	9	J. R. S.
Total Sitapur Division		4,400	2,585	59	1,283	29	532	12	
Rae Bareilly Division.									
45	Rae Bareilly	1,112	570	52	344	31	198	17	O. R.
46	Sultanpur	1,041	572	55	218	21	251	24	O. R.
47	Partabgarh	918	448	49	192	21	278	30	O. R.
Total Rae Bareilly Division		3,071	1,590	52	754	24	727	24	
Grand Total Oudh		14,684	8,299	57	3,986	27	2,399	16	
Provincial Grand Total North-Western Provinces and Oudh		66,951	34,000	51	14,023	21	18,842	28	

* N.B.—The figures in columns 2, 3, 5, and 7 represent thousands.

NOTE.—In remarks column St. denotes stony; S. sandy; O. usar or reh infected land; J. jungle and forest; R. river bed, or bank, or rocky ravine. P.S. signifies permanently settled.

STATEMENT II.—DETAILS of CULTIVATED AREA in ACRES.

District.	Total Cultivated Area.	Portion of Cultivated Area bearing more than one Crop in the Year.	Total Acreage under Crops in the year, i.e., Total of Columns 2 and 3.	Portion of Total Cropped Acreage under Food Crops.	Portion of Total Cropped Area of Column 4 under other Crops.	Per-centage of Food Crops to Total Cropped Acreage of Column 4.	Per-centage of other Crops to Total Cropped Acreage of Column 4.	Per-centage of Defaulsi to Total Cultivated Area.
1.	2.	3.	4.	5.	6.	7.	8.	9.
NORTH-WESTERN PROVINCES.								
Meerut Division.								
Saharanpur	825	70	895	726	169	81.1	18.9	8.5
Muzaffarnagar	700	37	737	580	157	78.7	21.3	5.3
Meerut	1,050	100	1,150	938	212	81.5	18.5	9.5
Bulandshahr	850	68	918	772	146	84.1	15.9	8.
Aligarh	950	100	1,050	880	170	83.9	16.1	10.5
Total Meerut Division	4,375	375	4,750	3,896	854	82.1	17.9	8.5
Rohilkhand Division.								
Bijnor	650	50	700	587	113	83.9	16.1	7.7
Moradabad	900	54	954	839	115	87.9	12.1	6.
Barilly	1,160	110	1,270	1,099	171	86.5	13.5	9.4
Budaun	840	50	890	788	102	88.5	11.5	6.
Shahjahanpur	740	40	780	659	121	84.5	15.5	5.4
Tarai	130	30	160	142	18	88.7	11.3	23.
Total Rohilkhand Division	4,420	334	4,754	4,114	640	86.5	13.5	7.5
Agra Division.								
M.tra	660	70	730	599	131	82.1	17.9	10.6
Agra	1,050	60	1,110	921	189	82.9	17.1	5.7
Mainpuri	608	40	648	560	88	86.5	13.5	6.5
Farakhabad	670	37	707	607	100	85.8	14.2	5.5
Etawah	550	65	615	501	114	81.5	18.5	11.8
Etah	620	40	660	565	95	85.6	14.4	6.4
Total Agra Division	4,158	312	4,470	3,753	717	83.9	16.1	7.5
Allahabad Division.								
Cawnpore	850	60	910	721	189	79.3	20.7	7.
Fatehpur	545	40	585	505	80	86.3	13.7	7.3
Banda	780	25	805	666	139	82.7	17.3	3.2
Allahabad	1,030	75	1,105	1,008	97	91.3	8.7	7.2
Hamirpur	750	29	779	618	161	79.3	20.7	3.8
Jaunpur	580	20	600	522	78	87.	13.	3.4
Total Allahabad Division	4,535	249	4,784	4,040	744	84.5	15.5	5.2
Benares Division.								
Azamgarh	936	68	1,004	862	142	86	14	7.2
Mirzapur	950	40	990	866	124	88	12	4.2
Benares	485	25	510	438	72	86	14	5.1
Gorakhpur	2,000	150	2,150	1,899	251	88	12	7.5
Basti	1,250	100	1,350	1,195	155	89	11	8.
Ghazipur	990	70	1,060	912	148	86	14	7.
Total Benares Division	6,611	453	7,064	6,172	892	87	13	6.8
Jhansi Division.								
Jalaun	580	20	600	518	82	86	14	3.4
Jhansi	350	10	360	300	60	83.3	16.7	2.9
Lalitpur	242	8	250	205	45	82	18	3.3
Total Jhansi Division	1,172	38	1,210	1,023	187	84.6	15.4	3.2

* The figures from columns 2 to 6 represent thousands.

STATEMENT II.—DETAILS OF CULTIVATED AREA.—*cont.*

CHAP. I. QN. 3.

NORTH-
WESTERN
PROVINCES
AND OUDH.

Mr. Elliott.

District.	Total Cultivated Area.	Portion of Cultivated Area bearing more than one Crop in the Year.	Total Acreage under Crops in the year, i.e., Total of Columns 2 and 3.	Portion of Total Cropped Acreage under Food Crops.	Portion of Total Cropped Area of Column 4 under other Crops.	Per-centage of Food Crops to Total Cropped Acreage of Column 4.	Per-centage of other Crops to Total Cropped Acreage of Column 4.	Per-centage of Dofasli to Total Cultivated Area.
1.	2.	3.	4.	5.	6.	7.	8.	9.
NORTH-WESTERN PROVINCES—<i>cont.</i>								
<i>Hill Tracts.</i>								
Dehra Dun - - - - -	73	4	77	54	23	70	29.8	5.4
Kumaun - - - - -				Unknown.				
Garhwāl - - - - -				Unknown.				
Total Hill Tracts - -	73	4	77	54	23	—	—	—
Provincial Total North-Western Provinces.	25,344	1,765	27,109	23,052	4,057	85	15	7
ODUH.								
<i>Lucknow Division.</i>								
Lucknow - - - - -	332	50	382	333	49	87	13	9.1
Bara Banki - - - - -	718	70	788	688	100			
Unao - - - - -	596	52	648	570	78			
Total Lucknow Division -	1,646	172	1,818	1,591	227			
<i>Fyzabad Division.</i>								
Fyzabad - - - - -	607	48	655	574	81	87	13	9.1
Bahraich - - - - -	801	82	883	768	115			
Gonda - - - - -	1,070	100	1,170	1,015	155			
Total Fyzabad Division -	2,478	230	2,708	2,357	351			
<i>Sitapur Division.</i>								
Sitapur - - - - -	917	94	1,011	874	137	87	13	9.1
Hardoi - - - - -	863	57	920	797	123			
Kheri - - - - -	805	60	865	748	117			
Total Sitapur Division -	2,585	211	2,796	2,419	377			
<i>Rae Bareli Division.</i>								
Rae Bareli - - - - -	570	50	620	547	73	87	13	9.1
Sultanpur - - - - -	572	50	622	541	81			
Partabgarh - - - - -	448	45	493	426	67			
Total Rae Bareli Division -	1,590	145	1,735	1,514	221			
Provincial Total Oudh -	8,299	758	9,057	7,881	1,176	87	13	9.1
Grand Total North-Western Provinces and Oudh.	33,643	2,523	36,166	30,933	5,233	85.5	14.5	7.5

The figures from columns 2 to 6 represent thousands.

STATEMENT No. III.—FOR TWENTY-FOUR DISTRICTS :—DETAILS OF CROP AREAS, OUT-TURN, AND REQUIREMENTS.
[N.B.—Three 0's are omitted throughout, except in the column of rate.]
MEERUT DIVISION.

	SAHARANPUR.			MUZAFFARNAGAR.			MEERUT.			BULANDSHAHAR.			ALIGARH.			TOTAL OF MEERUT DIVISION, EXCLUDING DEHRA.		
	Area in Acres.	Rate per Acre (in Maunds).	Out-turn in Maunds.	Area.	Rate per Acre.	Out-turn.	Area.	Rate per Acre.	Out-turn.	Area.	Rate per Acre.	Out-turn.	Area.	Rate per Acre.	Out-turn.	Area.	Average Rate of Produce.	Out-turn.
Food Crops.																		
Wheat - - - - -	270	10	2,700	220	10	2,200	300	11	3,300	140	11	1,540	182	11	2,002	1,112	10.56	11,742
Barley - - - - -	30	9	270	165	11	1,650	14	11	154	20	11	220	94	11	1,034	173	10.65	1,843
Gram - - - - -	100	9	900	46	9	414	110	9	990	44	9	396	47	9	423	347	9	3,123
Peas - - - - -	34	9	306	26	9	234	120	10	1,200	86	10	860	58	10	580	324	6	2,076
Wheat, mixed - - -	5	7	35	89	7	623	30	10	300	170	10	1,700	121	10	1,210	326	9.81	3,180
Barley, " - - - -	25	6	150	20	6	120	42	7	294	162	7	1,134	192	8	1,536	608	9.98	3,255
Jowar, " - - - -	40	6	240	20	4	80	24	10	240	70	7	490	83	7	581	255	7.81	4,750
Rajra - - - - -	134	10	1,340	44	10	440	24	10	240	3	10	30	7	70	212	255	6.76	1,755
Maize - - - - -	27	9	243	26	9	234	80	12	960	50	12	600	47	12	564	230	10	2,120
Pulses - - - - -	50	7	350	92.5	7	647.5	15	7	105	15	7	105	30	7	210	239.5	11.31	2,601
Small millets - - -	10	5	50	1.5	5	7.5	4	5	20	4	5	20	18	5	90	23.5	7	1,676.5
Miscellaneous - - -	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	11	77	—
Arhar (with cotton) -	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5	405
Total Food Out-turn -	725.6	—	6,643.1	580	—	5,090	938	—	9,086.5	772	—	7,358	880	—	8,692	3,895.6	—	36,869.6
Consumption as food at 5½ maunds per head.	—	—	5,083	—	—	3,967.5	—	—	6,997.5	—	—	5,362	—	—	6,175.5	—	—	27,605.7
Seed grain - - - -	—	—	513.8	—	—	358.75	—	—	591.25	—	—	441	—	—	499	—	—	2,403.8
Wastage at 5 per cent. on out-turn -	—	—	329.1	—	—	249.8	—	—	451.675	—	—	367	—	—	432.2	—	—	1,829.7
Food for cattle - -	—	—	619.	—	—	525	—	—	788	—	—	638	—	—	713	—	—	3,283.
Total - - - - -	—	—	6,544.9	—	—	5,101.	—	—	8,828.7	—	—	6,828	—	—	7,819.7	—	—	35,122.2
Surplus or Deficit -	—	—	+ 98.2	—	—	—11	—	—	+ 237.8	—	—	+ 530	—	—	+ 872.3	—	—	+ 1,747.4
Non-food Crops.																		
Sugar-cane - - - -	30	80	2,400	44	—	3,520	67	—	5,360	9	—	790	2.6	—	208	152.6	—	12,208
Cotton - - - - -	25	20	500	24	—	480	44.5	—	890	33	—	660	21.5	—	430	148	—	2,960
Cotton and arhar -	1	10	100	—	—	—	1.5	—	15	9	—	90	70	—	700	80.6	—	806
Fibres - - - - -	20	20	400	—	—	—	4	—	80	5	—	100	2	—	40	31.	—	650
Indigo - - - - -	9	20	180	3	—	60	6	—	120	26	—	520	45.7	—	914	81.6	—	1,632
Fooder - - - - -	52	20	1,040	80.5	—	161	60.7	—	1,214	30	—	600	12	—	240	235.2	—	4,704
Potatoes - - - - -	1	100	100	2	—	20	3	—	150	7	—	210	7	—	210	22	—	50
Garden crops - - -	1	30	30	1	—	30	5	—	100	4	—	200	5	—	250	12.1	—	605
Tobacco - - - - -	1	50	50	1	—	50	2	—	100	19.1	—	382	4.2	—	84	68.3	—	1,366
Opium - - - - -	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Oil seeds - - - - -	25	20	500	1	—	20	19	—	380	4	—	80	—	—	—	22.5	—	450
Miscellaneous - - -	15	20	300	1.5	—	30	2	—	40	4	—	—	—	—	—	—	—	—
Total Non-food Crops -	169.3	—	5,214	157	—	5,381	212	—	8,379	146.1	—	3,562	170	—	3,076	854.4	—	26,061

ROHILKHAND DIVISION.

	BURNOR.			BUDAPN.			MORADABAD.			BAREILLY.			SHAJAHANPUR.			TOTAL OF DIVISION.		
	Area.	Rate per Acre.	Out-turn.	Area.	Rate per Acre.	Out-turn.	Area.	Rate per Acre.	Out-turn.	Area.	Rate per Acre.	Out-turn.	Area.	Rate per Acre.	Out-turn.	Area.	Average Rate per Acre.	Out-turn.
Food Crops.																		
Wheat	92	10	920	240	10	2,400	174	11	1,914	214	12	2,568	212	12	2,544	932	11.1	10,346
Barley	44	9½	465.5	77	10	770	53	10	530	16	10	160	25	10	250	220	9.88	2,175.5
Gram	49	7	3.8	27	9	243	40	9	360	32	9	288	41	9	369	184	8.52	1,568
Peas	1	5	5	2	6	12	2	6	12	1	6	6	1	6	6	7	5.86	41
Wheat, mixed	44	8	352	49	10	490	111	10	1,110	58	10	580	33	11	363	295	9.81	2,895
Barley, "	3	8	24	21	9	189	20	9	180	12	9	108	4	9	36	60	8.95	537
Jowar	13	7	.91	102	7	714	60	7	420	56	8	448	90	8	720	321	7.45	2,393
Bajra	47	5	235	218	6	1,308	139	6	834	170	7	1,190	80	7	560	654	6.31	4,127
Rice	198	12	2,376	24	10	240	144	10	1,440	325	12	3,900	93	12	1,116	784	11.57	9,072
Maize	5	10	50	10	10	100	12	12	144	47	10	470	1	10	10	75	10.32	774
Pulses	76	7	532	15.5	7	108.5	75	7	525	50	7	350	45	7	315	261.5	7	1,830.5
Small millets	10	7	70	1	7	7	9	7	63	104	7	728	30	7	210	154	7	1,078
Miscellaneous	5	5	35	1.5	5	10.5	—	5	—	14	5	98	4	5	28	24.5	5	171.5
Arhar (under cotton)	—	—	45	—	—	260	—	—	155	—	—	115	—	—	80	—	—	655
Total Food Out-turn	587	—	5,510.5	788	—	6,852	839	—	7,687	1,099	—	11,009	659	—	6,607	3,972	—	37,665.5
Consumption as food at 5½ maunds per head.	—	—	4,237.7	—	—	5,376.2	—	—	6,454	—	—	8,665.2	—	—	5,459.6	—	—	30,192.7
Seed grain	—	—	378	—	—	446.7	—	—	455	—	—	635.8	—	—	397.8	—	—	2,313.3
Wastage at 5 per cent. on out-turn	—	—	270.8	—	—	342.6	—	—	363	—	—	550.4	—	—	330.8	—	—	1,857.1
Food for cattle	—	—	487	—	—	630	—	—	685	—	—	870	—	—	565	—	—	3,237
Total	—	—	5,373.5	—	—	6,795.5	—	—	7,957	—	—	10,721.4	—	—	6,752.7	—	—	37,600.1
Surplus or deficit	—	—	+137	—	—	+56.3	—	—	-270	—	—	+287.6	—	—	-145.7	—	—	+65.4
Non-Food Crops.																		
Sugar-cane	52	80	4,160	28	—	2,240	44	—	3,520	54	—	4,320	45	—	3,600	223	—	17,840
Cotton	31	20	620	5	—	100	10	—	200	14	—	280	—	—	160	60	—	1,200
" and arhar	9	10	90	52	—	520	31	—	310	23	—	230	16	—	160	131	—	1,310
Fibres	4	20	80	2	—	40	1	—	20	7	—	140	3	—	60	15	—	300
Indigo	—	20	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Rodder	3	20	60	1	—	20	1	—	20	10	—	200	15	—	20	4	—	80
Potatoes	—	100	—	—	—	—	—	—	100	11	—	1,100	12	—	300	30	—	600
Garden crops	2	30	60	3	—	90	7	—	210	35	—	1,050	18	—	540	65	—	1,200
Tobacco	1	50	50	1	—	50	1	—	50	1	—	50	—	—	—	4	—	1,950
Opium	—	50	—	7	—	350	—	—	—	1	—	50	9	—	450	17	—	200
Oil seeds	9	20	180	1	—	20	7	—	140	8	—	160	13	—	260	38	—	850
Miscellaneous	2	20	40	2	—	40	12	—	240	6	—	120	1	—	20	23	—	760
Total Non-food Crops	113	—	5,340	102	—	3,470	115	—	4,810	171	—	7,720	131	—	5,410	632	—	26,750

AGRA DIVISION.

	MUTTRA.			AGRA.			ETAH.			FARUCKABAD.			MAINPURI.			ETAWAH.			TOTAL OF DIVISION.		
	Area.	Rate per Acre.		Area.	Rate per Acre.		Area.	Rate per Acre.		Area.	Rate per Acre.		Area.	Rate per Acre.		Area.	Rate per Acre.		Area.	Average Rate of Produce.	
		Out-turn.			Out-turn.			Out-turn.			Out-turn.			Out-turn.			Out-turn.			Out-turn.	
Food Crops.																					
Wheat	80	13	960	12	1,848	106	12	1,272	183	12	2,196	152	12	1,824	35	12	420	710	12	8,520	
Barley	40	9	360	9	621	30	10	300	116	10	1,160	6	10	60	25	10	250	286	9.62	2,751	
Gram	55	9	495	9	666	21	9	189	22	9	198	11	9	99	27	9	243	310	9	1,890	
Peas	1	6	6	6	6	1	6	6	2	6	12	2	6	12	2	6	12	9	6	54	
Wheat, mixed	13	12	156	12	456	89	11	979	15	11	165	60	11	660	66	11	795	281	11.18	3,142	
Barley, "	120	9	1,080	9	1,314	58	9	522	11	10	110	113	10	1,130	115	10	1,150	563	9.42	5,306	
Jowar	220	7	1,540	7	1,652	83	7	581	95	7	665	100	7	700	110	8	880	844	7.24	6,113	
Bajra	32	6	192	6	936	126	6	756	79	7	553	51	7	357	79	7	553	523	6.39	3,347	
Rice	—	—	—	—	—	30	10	300	29	12	348	24	12	288	14	12	168	104	10	980	
Maize	—	—	—	—	—	72	12	864	15	10	150	28	10	280	28	10	280	98	10	980	
Pulses	26	12	312	12	224	8	7	56	15	7	105	4	7	28	2	7	14	19	7	133	
Small millets	—	—	—	—	—	2	7	14	10	7	70	4	7	28	2	7	14	19	7	133	
Miscellaneous	6	7	42	7	35	1	7	7	2	5	14	2	5	14	—	5	130	16	5	1,380	
Arhar (under cotton)	—	5	350	5	585	—	5	95	—	5	100	—	5	120	—	5	130	—	5	1,380	
Total Food Out-turn	599	—	5,435	—	8,452	565	—	5,227	607	—	6,071	560	—	5,621	501	—	4,800	3,753	—	85,605	
Consumption as food	—	—	4,197.5	—	7,199	—	—	4,042.2	—	—	5,234.2	—	—	4,404.5	—	—	3,846.7	—	—	28,974.1	
Seed grain	—	—	286.1	—	457.6	—	—	314.1	—	—	378.2	—	—	353.1	—	—	263.2	—	—	2,052.3	
Wastage	—	—	273.8	—	430.1	—	—	267.6	—	—	298.8	—	—	281	—	—	246.7	—	—	1,797.5	
Food for cattle	—	—	495.	—	797	—	—	465	—	—	402	—	—	496	—	—	412	—	—	3,067	
Total	—	—	5,251.9	—	8,883.7	—	—	5,088.9	—	—	6,363.2	—	—	5,584.6	—	—	4,768.6	—	—	35,890.9	
Surplus or Deficit	—	—	+ 183.1	—	- 431.7	—	—	+ 138.1	—	—	- 292.2	—	—	+ 86.4	—	—	+ 31.4	—	—	- 284.9	
Non-food Crops.																					
Sugar-cane	1	80	80	480	480	12	12	960	23	12	1,840	9	12	720	11	12	880	62	12	4,960	
Cotton	43	20	860	14	280	19	19	380	20	19	380	18	19	360	27	19	540	133	19	2,660	
Ditto and arhar	70	10	700	1170	1,170	19	19	380	20	19	380	24	19	360	26	19	380	276	19	2,660	
Fibres	1	20	20	80	80	2	2	40	18	2	360	12	2	240	20	2	400	69	2	1,380	
Indigo	2	20	40	140	140	10	10	200	18	10	360	7	10	240	20	10	400	69	10	1,380	
Fodder	5	20	100	540	540	16	16	320	2	16	320	4	16	320	14	16	280	280	16	2,000	
Potatoes	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Garden crops	3	30	90	150	150	11	11	330	8	11	240	4	11	120	5	11	150	36	11	1,080	
Tobacco	—	1	50	100	100	2	2	100	12	2	600	8	2	400	10	2	500	32	2	1,600	
Opium	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Oil seeds	5	20	100	120	120	2	2	40	1	2	20	4	2	80	1	2	40	18	2	360	
Miscellaneous	—	20	—	20	20	1	1	20	1	1	20	4	1	—	—	—	—	3	1	60	
Total Non-food Crops.	131	—	2,040	3,080	3,080	95	—	2,630	100	—	3,870	88	—	2,370	114	—	3,060	717	—	17,050	

ALLAHABAD DIVISION.

	CAWNPUR.			FATEHPUR.			ALLAHABAD.			BANDA.			HAMIRPUR.			TOTAL OF DIVISION EXCLUDING JALNPUR.		
	Area.	Rate per Acre.	Out-turn.	Area.	Rate per Acre.	Out-turn.	Area.	Rate per Acre.	Out-turn.	Area.	Rate per Acre.	Out-turn.	Area.	Rate per Acre.	Out-turn.	Area.	Average Rate of Produce.	Out-turn.
Food Crops.																		
Wheat	77	12	924	49	12	588	86	12	1,032	10	9	90	51	9	459	273	11.69	3,093
Barley	80	11	880	19	11	209	130	11	1,430	21	9	189	2	9	18	252	10.81	2,756
Gram	14	9	126	39	9	351	87	9	783	136	7	952	109	7	763	385	7.72	2,975
Peas	3	6	18	3	6	18	40	6	240	—	—	—	1	6	6	47	6	282
Wheat, mixed	86	12	1,032	31	11	341	150	11	1,650	161	8	1,288	262	8	2,096	690	9.28	6,407
Barley, "	186	10	1,860	132	10	1,320	140	10	1,400	48	8	384	40	8	320	546	9.57	5,284
Jowar	180	8	1,440	110	7	770	128	7	896	148	5	1,036	86	5	516	632	7.14	4,658
Bajra	35	7	245	27	7	189	109	7	763	40	5	200	49	5	245	260	6.31	1,642
Rice	23	12	276	75	12	912	71	12	852	29	10	290	1	8	8	200	11.69	2,338
Maize	26	12	312	1	12	12	1	12	12	—	—	—	—	—	—	28	12	336
Pulses	3	7	21	3	7	21	21	7	147	—	—	—	8	7	56	55	7	385
Small millets	3	7	21	15	7	105	45	7	315	—	—	—	9	7	63	125	7	875
Miscellaneous	5	5	255	—	5	205	—	5	75	—	—	—	—	5	185	5	5	35
Arhar (under cotton)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1,295
Total Food Out-turn	731	—	7,445	505	—	5,041	1,008	—	3,595	666	—	5,515	618	—	4,735	3,518	—	32,331
Non-food Crops.																		
Consumption as food	—	—	6,647	—	—	3,817.4	—	—	9,028.1	—	—	4,011.2	—	—	3,043.3	—	—	25,546
Seed grain	—	—	426.8	—	—	291.7	—	—	599.2	—	—	336.7	—	—	388.8	—	—	2,048.2
Wastage	—	—	376.1	—	—	252	—	—	479.7	—	—	272.1	—	—	235.9	—	—	1,615.8
Food for cattle	—	—	637	—	—	409	—	—	772	—	—	385	—	—	562	—	—	2,965
Total	—	—	8,086.9	—	—	4,770.1	—	—	9,879	—	—	5,205	—	—	4,229	—	—	32,170
Surplus or Deficit	—	—	—	—	—	+ 270.9	—	—	—284	—	—	+ 310	—	—	+ 506	—	—	+ 161
Non-food Crops.																		
Sugar-cane	—	—	720	6	—	480	12	—	960	—	—	—	5	—	400	32	—	2,560
Cotton	25	20	500	4	—	80	10	—	200	—	—	240	27	—	540	78	—	1,560
" and arhar	51	10	510	41	—	410	25	—	250	—	—	1,150	37	—	370	269	—	2,690
Fibres	2	20	40	2	—	40	1	—	20	—	—	20	2	—	40	8	—	160
Indigo	33	20	660	2	—	40	1	—	20	—	—	20	1	—	20	38	—	760
Fodder	44	20	880	—	—	—	3	—	60	—	—	—	—	—	—	48	—	960
Potatoes	—	—	—	—	—	—	1	—	100	—	—	—	—	—	—	1	—	100
Garden crops	14	30	420	19	—	570	10	—	300	—	—	—	3	—	90	48	—	1,440
Tobacco	1	50	50	1	—	50	2	—	100	—	—	—	1	—	50	6	—	300
Opium	7	50	350	4	—	200	6	—	300	—	—	—	1	—	50	18	—	900
Oil seeds	—	20	60	1	—	20	25	—	500	—	—	120	80	—	1,600	115	—	2,800
Miscellaneous	3	20	—	—	—	—	—	—	—	—	—	—	—	—	100	5	—	100
Total Non-food Crops	189	—	4,190	80	—	1,890	97	—	2,830	139	—	1,710	161	—	3,210	666	—	13,830

AGRICULTURAL STATISTICS.

JHANSI DIVISION.

	JHANSI.			JALPAUR.			TOTAL OF DIVISION.			GRAND TOTAL OF THE 24 DISTRICTS.		
	Area.	Rate per Acre.	Out-turn.	Area.	Rate per Acre.	Out-turn.	Area.	Rate of Produce.	Out-turn.	Area.	Average Rate of Produce.	Out-turn.
Food Crops.												
Wheat	81	8	648	3	8	24	272	118	8	3,145	11.01	34,645
Barley	1	9	9	4	9	36	36	9	81	940	10.18	9,576.5
Gram	48	7.5	360	83	7.5	622.5	180	7.5	1,350	1,281	8.37	10,718.5
Peas	1	6	6	5	6	30	—	6	30	103.6	5.97	615.6
Wheat, mixed	48	7	336	262	7	1,834	136	7.05	2,306	1,917	9.35	17,930
Barley, "	2	9	18	28	9	252	—	30	270	2,14	9.57	14,596
Jowar	77	6	462	75	6	450	138	6	1,050	2,600	7.29	18,964
Bajra	13	5	65	53	5	265	—	66	330	1,758	6.35	11,171
Rice	2	8	16	1	8	8	120	15	144	1,309	11.19	14,654
Maize	—	—	—	—	—	—	50	10	500	442	11.33	5,009
Pulses	—	—	—	—	—	—	70	10	700	656	7	7,987
Small millets	27	7	189	4	7	28	532	107	749	428.5	5	4,038
Miscellaneous	—	—	—	—	—	—	6	—	255	—	—	—
Arhar (under cotton)	—	—	—	—	—	—	—	—	—	—	—	—
Total Food Out-turn	300	—	2,174	518	—	3,678.5	1,534	—	7,386.5	16,161.6	9.20	149,896.6
Non-food Crops.												
Consumption as food	—	—	1,827.3	—	—	2,325.8	—	—	5,375.5	—	—	117,694.0
Seed grain	—	—	169.3	—	—	318.5	—	—	587.4	—	—	9,400.0
Wastage	—	—	106.0	—	—	177.8	—	—	356.5	—	—	7,456.6
Food for cattle	—	—	262	—	—	435	—	—	879	—	—	13,431
Total	—	—	2,364.6	—	—	3,257.1	—	—	7,198.4	—	—	147,981.6
Surplus or Deficit	—	—	—	—	—	—	—	—	188.1	—	—	1,915
Non-food Crops.												
Sugar-cane	—	—	—	—	—	—	—	—	—	—	—	—
Cotton	15	20	300	20	20	400	480	8	640	477.6	—	38,108
" and arhar	13	10	130	38	10	380	40	37	740	456.0	—	9,120
Fibres	1	20	20	1	20	20	—	51	510	807.6	—	8,076
Indigo	—	20	—	—	20	—	—	2	40	64.0	—	1,280
Fodder	—	20	—	—	20	—	—	8	160	192.6	—	3,852
Potatoes	—	100	—	—	140	—	—	—	—	390.2	—	7,804
Garden crops	—	30	—	—	180	—	—	—	240	155	—	1,550
Tobacco	—	50	—	—	50	—	—	8	40	179.0	—	5,370
Opium	—	50	—	—	50	—	—	1	50	32.1	—	1,605
Oil seeds	—	20	—	—	140	—	—	72	1,440	67.0	—	3,350
Miscellaneous	—	20	—	—	—	—	—	—	—	53.5	—	6,226
Total Non-food Crops	60	—	1,990	82	—	1,470	1,260	187	3,820	3,046.4	—	87,411

CHAP. I. QN. 3.

BENGAL.

Mr. Toynbee.

Such figures as are available by way of reply to the first part of the Commission's third question are given in tabular form in the accompanying statement. They are taken chiefly from returns which are prepared by district officers (in Form XLI. B.), and submitted annually to Government through the Board of Revenue. They cannot be regarded as being more than the best approximation to the truth which collectors are able to make. The preparation of accurate general agricultural statistics, such as those indicated in this question, is at present impossible in these provinces.

Really accurate agricultural statistics could only be collected in these permanently settled provinces by detailed inquiries of great extent, following a cadastral survey, and involving much delay and enormous expense to Government. In the absence of any village organization, such as that which exists in the North-Western Provinces, it would be necessary to entertain a special and costly establishment to record the information required.

As regards produce per acre, so various are the soils, so different is the rainfall, so numerous are the modes of cultivation, the crops and their out-turn in the various districts of Bengal, that it is quite impossible to fix any absolute standard figure representing the average out-turn of an acre of land under any given food crop. As a rule the cultivators themselves do not know it with any tolerable degree of accuracy. From such experiments and inquiries as have been made in Bengal from time to time, and after analysing all the statistics available on the subject, Captain Ottley, R.E., came to the conclusion that as regards rice—the great staple crop of Bengal—the average out-turn for a number of years of all classes of land will be about 15 maunds per acre. This may be accepted as the nearest possible approximation to the truth, but not as a safe basis for calculation. As regards export from, and import into, his district, a collector can only say generally whether grain is going out of or coming into it, or both. If there is a railway or a navigable river running through it he can roughly gauge the imports and exports at certain fixed points and obtain figures which may be of use to him in forming a general view of the state of his district: beyond this he cannot go. Even if funds were available, trustworthy agency would be wanting. A system of inter-district traffic registration, by which the exports from and imports into each district could be ascertained with any degree of accuracy, has never been attempted and would be quite impossible in Bengal.

An attempt has already been made to work out statistics such as those indicated by the Committee in

BENGAL.

their third question. The result is given in a work of over 300 pages by Mr. A. P. MacDonnell, C.S., entitled "Report on the food grain supply and statistical review of the relief operations in the distressed districts of Behar and Bengal during the famine of 1873-74." Such figures as Mr. MacDonnell worked out for production, consumption and export have been reproduced in the statement on the following page, but as, after a careful and laborious examination of all the sources of information available, he rejected all the others as worthless and liable to mislead, they have not been here worked out for the Commission. Mr. MacDonnell has, in the introduction to his work, fully explained in detail the process by which he has arrived at his figures, and it is not necessary to recapitulate them. He says, "No other character, however, than approximations to the truth is claimed for these estimates This question of average rates of produce has been one of the most perplexing with which I have had to deal. *One maund, more or less, per acre may alter the complexion of a conclusion.*" A glance at Appendix No. III. to Mr. MacDonnell's work will show how hopeless is the task of arriving at a safe figure of produce per acre amid so wide a range of estimates; and when it is considered that the figures for the consumption per head of the population are merely approximations, it will be seen how impossible is the task of attempting to give accurate and reliable agricultural statistics without a cadastral survey and detailed field to field inquiries. As the settlement of these provinces is permanent, the cost of such a procedure, which is the only one by which really reliable figures could be obtained, would perhaps be out of all proportion to the value of its results. It would give no increase of revenue; it would alarm the people, and the landholders would throw every obstacle in the way of our obtaining the information sought for.

In 1872-73 special inquiries were made by Native deputy collectors with a view of collecting agricultural statistics for the selected districts of Jessore and Rungpore. The results of these inquiries are embodied in two volumes full of interesting and useful information, but as it was not based on a cadastral survey it possesses *per se* little or no real statistical value. This method of collecting agricultural statistics has not therefore been extended to other districts. The mode of procedure adopted—whereby deductions are made for the whole district from the results of inquiries made in portions of it—is not adapted to a province like Bengal, where not only each district but also each pergunnah of every district, may present features differing essentially from those of neighbouring and adjoining districts and pergunnahs.

AGRICULTURAL STATISTICS.

STATEMENT showing details of Cultivation, &c.

CHAP. I. QN. 3.

BENGAL.

Mr. Toynbee.

Division.	District.	Total Area of District in Acres.	Estimated Cultivated Area in Acres.			Estimated Average Out-turn per Acre in Maunds of			Total estimated quantity of Food Grain produced in the District.	Total estimated amount required for Food and Seed in the District.	Balance available for Export.
			Food Crops.	Other Crops.	Total.	Rice.	Bhadol.	Rubbee.			
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
Burdwan	Burdwan	2,211,200	1,894,080	115,000	2,009,080	—	—	—	Tons.	Tons.	Tons.
	Bankoora	910,080	406,000	17,000	423,000	13	4	4	195,000	181,000	64,000
	Beerbhoom	860,160	556,400	10,000	566,400	—	—	—	—	—	—
	Midnapore	3,252,480	1,927,000	382,000	2,309,000	—	—	—	—	—	—
	Hooghly with Howrah	938,880	709,050	109,700	818,750	—	—	—	—	—	—
Presidency	24 Pergunnahs	1,784,320	973,387	68,098	1,036,485	—	—	—	—	—	—
	Nuddea	2,189,440	914,538	149,182	1,063,720	—	—	—	—	—	—
	Jessore	2,341,120	1,704,900	79,400	1,784,300	—	—	—	—	—	—
	Moorsheadabad	1,575,680	881,000	108,000	989,000	15	12	12	457,000	327,000	130,000
	Rajshahye	—	—	—	—	—	—	—	—	—	—
Rajshahye	Dinagopore	2,640,640	1,353,000	336,000	1,689,000	12	—	—	574,000	383,000	191,000
	Rajshahye	1,429,760	696,064	199,802	895,866	—	—	—	—	—	—
	Rungpore	2,224,640	1,644,000	290,000	1,934,000	15	7	10	801,000	501,000	300,000
	Bogra	960,640	848,423	115,617	964,040	—	—	—	—	—	—
	Pubna	1,265,920	409,523	30,317	439,842	—	—	—	—	—	—
	Darjeeling	—	—	—	—	—	—	—	—	—	—
	Julpigoree	1,859,840	300,940	49,779	350,719	—	—	—	—	—	—
	Dacca	1,789,440	1,171,248	125,265	1,296,513	—	—	—	—	—	—
Dacca	Furreedpore	1,439,360	650,440	54,200	704,640	—	—	—	—	—	—
	Backergunge	2,334,720	2,174,213	232,421	2,406,634	—	—	—	—	—	—
	Mymensingh	4,031,360	1,278,476	151,988	1,430,464	—	—	—	—	—	—
	Tippurah	1,574,400	1,148,364	122,285	1,270,649	—	—	—	—	—	—
	Chittagong	1,486,080	536,802	7,838	544,640	—	—	—	—	—	—
Chittagong	Noakholly	1,185,280	660,186	42,954	703,140	—	—	—	—	—	—
	Chittagong Hill Tracts	—	—	—	—	—	—	—	—	—	—
	Patna	1,344,640	1,116,257	46,896	1,163,153	—	—	—	—	—	—
Patna	Gya	3,018,240	1,640,000	88,000	1,728,000	12	8	10	640,000	520,000	120,000
	Shahabad	2,806,400	1,610,000	80,000	1,690,000	12	8	12	670,000	462,000	208,000
	Durbhunga	1,922,560	1,964,009	85,000	2,049,009	13	12	8	861,000	629,000	241,000
	Mozufferpore	2,134,400	1,712,000	104,000	1,816,000	12	12	10	751,000	578,000	173,000
	Sarun	1,608,560	2,042,000	278,000	2,320,000	10	9	9	671,000	547,000	124,000
	Chumparun	2,253,840	1,308,000	129,000	1,437,000	12	7	7	517,000	352,000	165,000
	Bhagalpore	2,510,080	1,802,000	150,000	1,952,000	12	11	11	658,000	484,000	174,000
	Bhagalpore	2,731,520	2,326,800	509,071	2,835,871	—	—	—	—	—	—
Bhagalpore	Purneah	3,172,480	1,300,823	285,634	1,586,457	—	—	—	—	—	—
	Maldah	1,160,320	353,390	89,232	442,622	—	—	—	—	—	—
	Sonthal Pergunnahs	3,512,320	682,619	132,588	815,207	—	—	—	—	—	—
	Orissa	2,888,320	1,237,900	112,100	1,350,000	—	—	—	—	—	—
Orissa	Pooree	1,582,080	640,185	24,135	664,320	15	—	—	—	—	—
	Balasore	1,323,520	545,859	37,400	583,259	—	—	—	—	—	—
	Chota Nagpore	4,433,440	1,196,624	122,288	1,318,912	—	—	—	—	—	—
Chota Nagpore	Lohardugga	7,708,160	2,552,359	271,379	2,823,738	—	—	—	—	—	—
	Singbhoom	2,494,080	571,346	64,302	635,648	—	—	—	—	—	—
	Manbhoom	3,149,440	1,193,600	619,200	1,812,800	—	—	—	—	—	—
	Total	92,196,240	48,634,497	6,010,971	54,645,468	—	—	—	6,795,000	4,905,000	1,890,000

(1) Note.—Each acre double cropped is counted as two acres.

(2) Column 11 is calculated by Mr. MacDonnell on the supposition that, in Behar, every head of the population consumes three-fourths of a seer and in Bengal two-thirds of a seer daily, and that for seed 10 seers for *bhadol* and 30 seers for rice and *rabi* per acre are required in Behar, and one maund for rice and 10 seers for other crops in Bengal. See pp. 8, 217, 218

CHAP. I. QN. 3.

CENTRAL PROVINCES.

Mr. Nicholls.

CENTRAL PROVINCES.

The required statistics are given in the following tables:—

CROPS CULTIVATED IN ACRES.

Districts.	Rice.	Wheat.	Other Food Grains.	Oil Seeds.	Sugar-cane.	Cotton.	Opium.	Indigo.	Fibres.	Tobacco.	Vegetables.	Others.
Nagpur	32,887	260,473	551,493	191,483	1,656	120,449	37	—	1,200	958	12,103	7,640
Bhandara	426,005	69,308	240,346	49,018	8,509	24	—	—	468	144	4,365	640
Chanda	227,276	53,799	271,600	85,931	5,906	36,330	—	—	1,042	1,486	9,777	—
Wardha	2,035	170,173	345,577	154,228	680	222,421	20	—	1,032	1,403	1,206	3,497
Balaghat	308,302	16,659	111,604	24,577	2,363	—	—	—	28	883	923	161
Upper Godavari	4,227	236	16,302	1,713	6	635	—	—	—	252	—	—
Jubbulpore	155,894	370,421	389,069	91,362	2,057	22,565	449	—	1,755	348	1,743	891
Saugor	15,772	455,375	209,171	64,205	4,052	28,384	91	3	1,260	819	2,452	4,085
Damoh	55,501	196,047	180,006	35,714	877	12,788	5	256	676	661	1,132	2,354
Seoni	100,589	274,005	190,925	39,211	1,058	9,336	139	—	2,888	74	554	—
Mandla	75,283	80,035	228,823	20,630	830	657	—	—	3,174	604	332	37
Chhindwara	3,974	144,323	311,051	66,443	9,543	40,928	517	—	718	—	1,515	—
Hoshangabad	18,021	566,988	195,460	66,600	10,375	23,630	182	—	518	951	1,108	38,143
Narsinghpur	27,413	261,776	257,515	8,888	2,384	54,926	24	30	1,266	614	1,517	1,077
Betul	17,318	189,246	382,758	59,047	8,577	2,209	1,871	—	3,601	110	2,425	6
Nimar	13,123	12,455	270,508	32,331	289	38,272	173	—	2,329	134	889	1,335
Raipur	1,175,870	206,837	555,273	185,162	33,059	82,547	—	—	1,118	36,919	4,819	10,612
Sambalpur	990,590	—	212,250	106,666	4,875	49,827	—	—	1,500	2,681	5,110	2,228
Bilaspur	872,985	73,906	179,420	67,100	10,520	56,500	—	—	—	—	—	—
Total	4,523,670	3,471,122	5,058,760	1,350,397	107,805	802,437	3,517	289	26,082	40,041	51,970	72,706

AGRICULTURAL STATISTICS.

GENERAL STATEMENT showing the AVERAGE PRODUCE and LOCAL CONSUMPTION with Amount available for Export of EDIBLE GRAINS in the CENTRAL PROVINCES, compiled from the Statements received from District Officers.

Districts.	Area Cultivated with Edible Grain in Acres.				Total Average Edible Grains.	Produce of each Grain in Lbs.				Total Produce.		Local Consumption in Maunds.				Available for Export.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
	Rice.		Wheat.			Rice.	Wheat.	Others.	Lbs.	Maunds.	Population.	Food at 5 Maunds per Head per Annum.	Seed at 11 Maunds per Acre for Rice, 1 for Wheat, and 4 for Others.	Sundries, Cattle Wastage, &c., Maund per Person.	Total.	Maunds.	Tons.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
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CHAP. I. QN. 3.

CENTRAL
PROVINCES.

Mr. Nicholls.

The tables are founded on the annual village papers prepared by the patwaris showing the area and crop cultivated in each field. Great trouble is taken to get patwaris to give correct returns, or in those districts where there are no patwaris, to obtain them from the malguzars. Probably the total areas under each kind for fields long under cultivation are pretty correctly given. Where two or more crops are grown in the same field the difficulty is greatly increased; and probably in districts where the area of cultivation is rapidly extending; the newly broken lands are sometimes omitted for a year or so. Accordingly I am inclined to think that our area is under stated.

The averages of produce are taken from the settlement reports, and represent the produce of average good years. In a few cases experience has led us to reduce the out-turn factor. I think our figures are within the mark as to average produce.

The local consumption has been calculated thus:— for each head of population, men, women, and children, 5 maunds each per annum, or daily for a man $1\frac{1}{2}$ lb., for a woman 1 lb., for a child $\frac{3}{4}$ lb. This on our population gives close on 5 maunds. To this is added for seed, rice $1\frac{1}{4}$ maund, wheat 1 maund, and others $\frac{1}{2}$ maund, for each area cultivated. Provision has also been made for wastage, food for cattle, &c., at $\frac{1}{2}$ a maund per head of population. The vegetables generally consumed, with the condiments, with fish, and animal food now and then obtained, give a fair addition to the grain supposed to represent the average consumption.

No deduction has been made on account of the jungle fruits and gums, and roots, always available for a part of the year to the forest tribes. Again, as a source of food supply, mhowa is of very great importance. I have done my best to form an estimate of the quantity which, as a minimum might be consumed in ordinary years; but I cannot venture on figures. In Betul it is consumed for some three or four months of the year by those who eat it, probably every other day.*

The following extract of a letter just now received by me (7th August 1878) shows how mhowa is now regarded in the Seoni District:—

"I now beg to submit for your perusal two petitions submitted by Kallars of Lakhnadon, praying that the rate of duty on *mhowa* may be reduced.

"They urge the high price at which mhowa is selling, owing partly to export and partly to the fact that it is largely used for food; also that the price of 20 seers of mhowa is Rs. 1-4, or 4 annas per 'kuru.'

"They also beg that Government will supply them with mhowa.

"Inquiry made here shows that the following mahajans have exported mhowa to Nagpur and Kamptee as follows:—

	Exported. Khandies.	In stock. Khandies.
Madhopershad	- 1,000	100
Murlidhar	- 500	20
Ramji, Marwari	- 1,500	100
Sewaji	- 200	—
Sookh Lal	- 1,000	100
Moona Lal	- 200	—
Kirparam	- 500	—
	4,900	320

"It is also undoubted that zamindars have made large purchases to feed their tenants, for instance

* Total population	-	8,201,519
Forest tribes	-	1,494,087
Bhil, Bhilal, Kol, Kurku, Gond, Meria, Khond, Byga, Barras, Sond, and others.	-	

Goolab Singh of Darasi purchased 1,000 khandies, and others have done the same.

"The consequence is that the price of mhowa has enormously risen, being in many places 5 or 6 rupees a khandi, and the Kallars who have been accustomed to buy at 1 rupee to 2 rupees a khandi feel the rise severely, especially as they are unable to raise the price of liquor, owing to the generally impoverished condition of the drinking classes."

From inquiries at Nagpur, it appears that much mhowa intended for the Bombay Presidency, but countermanded, has accumulated in the city. Only a small portion was despatched by railway. Such purchases in the Satpura districts would be likely to create alarm, if not panic.

I have made no deduction for this large substitution of mhowa in place of cereals, and this will, I think, compensate for an unknown or rather uncertain increment to the population since the date of the census of January 1872.

There is also some amount of cultivation in the unsettled Government waste lands, which now produces grain and other crops; of this I have no statistics, and its produce has been excluded from the statement.

The Settlement Officer of Nimar in 1870 wrote that the district imported a considerable part of its food. I, therefore, am doubtful of my figures for Nimar. For the rest, I consider that we have fairly reliable statistics, and I cannot see any way of improving them till the Central Provinces Revenue Bill, now before the Government of India, shall have been passed.

Since writing the above I have received the following account, based on the experience of the Native Assistant Commissioner for the Balaghat District. Out of a total population of 325,000 people about 100,000 people use mhowa as food from June to April, and between 70,000 and 80,000 maunds of mhowa are thus consumed, the daily allowance may be stated at about 4 chittacks.

Of the minor forest produce about 5,000 maunds of semat* and kanhikund† are used for food.

About 80,000 maunds of cereals may be deducted. That is, it is estimated that the saving of cereals through the consumption of the crops of mhowa and forest produce amounts to 2,962 tons annually. My own impression is that it is very generally consumed in ordinary years from the middle of May to the end of September, and then forms about a third part of the food consumed by those who at all use it as food.

In Sangor the cost of mhowa is now two and a half times as high as is usual, and in Hoshangabad the Kallars are in difficulties owing to the enhanced cost, although it is believed that the crop was far from scanty.

The Deputy Commissioner of Sambalpur writes:—

"There is at present not sufficient information to enable me to submit an estimate of how many people make use of mhowa as food. Mr. Russell (late settlement officer), while out marching, evidently made some inquiries, for in his diary of the 10th February he writes: 'Here the staple rice is supplemented by mhowa, which in the jungly parts constitutes the only food for about two months, sub-jungly for one month; other grains, beans, &c. for another month; and in the very wild parts, roots and tubers resembling in appearance sweet potatoes.'

"The Raja of Rehrakol told me that in his state no one ever died of hunger, because the jungles furnished ample supplies of fruit, roots, leaves, &c., on which they subsist when grain is scarce and not within their reach."

* Bombax malabaricum.

† Tacca pinnatifida. (?)

BERAR.

In the following tables I give: 1st the average area under cultivation during the past four years; and 2nd the estimated out-turn and consumption of grain, and the surplus that remains for export.

A.

AVERAGE CULTIVATION in each DISTRICT.

Districts.	Edible Grains.								Other Crops.							Grand Total.
	Jowari.	Wheat.	Bajri.	Gram.	Rice.	Tur.	Urid.	Total.	Cotton.	Linseed.	Til.	Lac.	Kurdi.	Tobacco.	Other Products.	Total.
Amraoti	490,375	115,811	654	21,777	1,240	10,714	1,070	641,650	492,305	61,793	36,706	16,933	2,083	11,455	67,449	688,784
Akola	471,359	65,850	19,576	26,537	407	22,055	5,894	611,678	534,600	40,725	24,970	15,246	850	3,138	78,066	607,685
Ellichpur	199,370	43,649	685	15,354	7,769	20,622	3,024	290,473	222,822	16,727	10,279	6,826	1,233	6,139	36,152	300,178
Buldana	348,384	137,221	84,130	41,748	6,323	9,165	2,369	629,345	280,821	18,030	24,144	4,269	25,663	2,518	86,143	436,588
Wun	439,886	32,708	339	12,663	2,373	18,118	3,393	569,480	244,534	15,657	22,631	2,905	32	1,949	80,041	367,649
Basim	296,182	103,099	6,207	67,645	14,238	16,038	20,180	623,539	184,219	3,966	26,149	24,505	24,456	2,515	146,518	411,418
Total in province.	2,245,556	498,338	111,593	185,722	32,364	96,712	35,930	3,206,215	1,959,391	150,798	144,870	70,824	53,327	27,714	404,369	2,902,302

B.

GENERAL STATEMENT showing the AVERAGE PRODUCE and estimated LOCAL CONSUMPTION with amount available for EXPORT.

	Average cultivated with Edible Grains in Acres.			Total Average cultivated with Edible Grains.	Average Produce per Acre in Lbs.			Produce of each Grain in Maunds.				Local Consumption in Maunds.			Available for Export.	
	Jowari.	Wheat.	Other Grains.		Jowari.	Wheat.	Other Grains.	Jowari.	Wheat.	Other Grains.	Total.	Food at 5 Maunds per Head per Annum.	Seed at 12 lbs. per Acre.	Total.	Maunds.	Tons.
Total in province	2,245,556	498,338	462,321	3,206,215	420	250	250	11,789,169	1,557,906	1,444,753	14,791,228	11,138,270	962,034	12,100,304	2,690,926	94,678

The area returns are compiled from returns rendered by the village patwaris, and may be accepted as correct.

The other figures are merely approximate estimates.

The district estimates of the out-turn of produce vary very greatly.

In 1866-67 the estimate for the chief crops was as follows:—

	Wheat.	Rice.
Amraoti	356	227
Akola	188	134
Ellichpur	356	206
Buldana	283	166
Wun	229	234
Basim	350	260
Total	3052	2041

A series of experiments carried out some years ago by the survey officers to ascertain the out-turn of jowari gave the following results:—

Officer who experimented.	Highest yield.	Lowest yield.	Average yield.
Colonel Elphinstone	Lbs. 1,842	Lbs. 488	Lbs. 1,165
Major Mackenzie	1,484	415	949
Captain Pemberton	1,990	840	1,410
Mr. Jambull	915	580	762
Mr. Morans	1,120	880	1,000
Average	1,474	41	67

Colonel Nemblard, in referring to these experiments wrote as follows:—

"The land which yielded 1,842 lbs. is stated by Colonel Elphinstone to have been very superior, and it had been manured. The lowest yield met with by any of these officers was 415 lbs. Mr. Pemberton's experiments were carried out in the Morsi Taluka, where the soil is good and retentive of moisture, and it will be observed that his averages are higher than those of any other officer.

"As a rule, I think we get as good information from respectable landowners, who are civilized enough to know that our inquiry proceeds from no motive inimical to their interests, as from any tests which we ourselves have the leisure to apply, and from them I learn that an acre of millet (jowari) grown on fairly good land, and in an ordinary good season, yields from 9 to 10 maunds of grain, say 800L. This would be in the better sorts of the valley. Of course in the thinner and poorer soils of districts above the Ghats the average yield would be much smaller, probably not more than about 500L."

The actual results obtained on the Government farms, which were under the supervision of professional European gardeners, are shown below:—

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BERAR.
Mr. Dunlop.

Years.	Farm.	Rainfall.	Out-turn.		
			Jowari.	Wheat.	Gram.
1870-71	Akola - -	Inches. 29.07	Lbs. 660	Lbs. —	Lbs. —
"	Do. - -	—	533	315	241
"	Amraoti - -	40.30	—	240	181
1871-72	Akola - -	12.07	—	200	—
"	Amraoti - -	19.22	525 230 300 202 151 120 507	166	111
1872-73	Akola - -	45.80	1,317 136 564 404 253 530 341	—	—
"	Amraoti - -	37.61	412	280	161
1873-74	Akola - -	31.01	—	287	219
Average -			423	246	175

The soil of the farms was not very well suited for either wheat or gram crops, and the out-turn of these was probably smaller than is generally obtained from fields in the valley of Berar. My estimate of the average out-turn of grain crops based on the above figures is—

	Lbs.
Jowari - - -	420
Wheat - - -	250
Other grains - - -	250

A table (Statement I.) showing for each district the population, revenue, total area unculturable and culturable, is appended. It has not been possible to show separately in this the particulars of land which, although held on a cultivating lease, is kept for grazing purposes by the holders.

Statement II. gives the particulars per district which Statement B. in my first report gave for the whole province. I have, however, still adhered to my own estimate of the average out-turn per acre of each crop. The district figures on this head vary* so much that it is impossible to accept them.

My estimate of an average consumption of 5 maunds of grain per head per annum was based on local inquiries which seemed to show that adults eat about 20 ounces of grain per day.

According to the Census figures of 1867 there are in Berar:—

	Male.	Female.	Total.
Adults - - -	731,142	704,232	1,435,374
† Infants - - -	422,055	374,136	796,191

† Under 13 years of age.

The proportion of total infants to total adults is 55.4, or, roughly, there are two adults to one infant. Calculating then that a man eats 20 ounces of grain

* As an example of this I here give the district estimates of jowari out-turn in 1877-78:

Estimated Out-turn per Acre.

	Lbs.
Amraoti - - -	442
Akola - - -	92
Ellichpur - - -	574
Buldana - - -	362
Wun - - -	350
Basim - - -	370

per day, a woman about the same, and an infant say half* that quantity, my estimate is,—

For one man per annum - -	6 maunds.
For one woman per annum - -	6 "
For one child per annum - -	3 "
Total - - -	15 "

Average per head for three persons 5 maunds.

The crop statistics given at paragraph 3 of my report do not profess to include the areas of jagir and inam lands; but there is some reason to suppose that the practice in recording these statistics has varied in different districts. No specific information in regard to crop statistics of jagir and inam lands is, however, available.

I now append copies of Statements III. and IV. of the Commissioner's Revenue Report for 1877-78, which contain later and fuller information than I was previously able to give:—

Statement III., showing the progress of cultivation during the year 1877-78, gives the total cultivated area of the province at 6,911,589, which is classified as follows:—

In reserved forests - -	10,259
In izara, or leased villages - -	325,725
In jagir villages - -	228,306
In palamput villages - -	5,264
In other villages - -	6,842,035
Total - - -	6,911,589

Statement IV., showing the area under each kind of crop in 1877-78, gives the total area under cultivation at 6,470,037 acres, and the difference between the two returns is thus accounted for by the Commissioner:—

"Between column 7 of Statement III. and the total cultivation shown by Statement IV. the following differences appear:—

	Amraoti.	Akola.	Ellichpur.	Buldana.	Wun.	Basim.
Column 6, Statement A.	1,403,685	1,421,739	612,029	1,308,807	1,065,195	1,100,141
Statement IV.	1,368,330	1,281,240	607,906	1,122,724	1,048,976	1,041,039
Differences -	35,355	140,499	4,033	186,083	16,220	59,102

"As the heading 'Cultivated' in Statement III. means 'occupied for cultivation' these differences should indicate the amount of land retained by occupiers for pasturage.

"The Deputy Commissioner, Akola, explains that of the difference in his district, 91,899 acres only represent occupied land under grass, the rest being due to the omission of jagir and inam lands in Statement B.

"The small amount of land retained for grass in Ellichpur is said to be attributable to the proximity of the Melghat jungles, to which cattle go for grazing.

"The Deputy Commissioner, Buldana, after stating that of the difference, 186,083 acres in his district, 121,957 acres consist of indifferent and grass land in the khalsa occupied area, goes on to explain that while Statement A. includes jagir and inam cultivation, Statement B. includes nothing but the area actually under the plough in khalsa land, and that the remaining 64,126 acres of difference may be put down to the cause.

"The largeness of the figures 121,957 which, after this explanation, represent land reserved for grass, suggests a doubt as to its accuracy, but it is impossible, without delaying this report, to inquire further now.

* A boy of 12 years will eat more than 3 maunds, but this is made up for by very young infants eating no grain.

† p. 82; but of Statement III. the total only has been given, and Statement IV. has been re-arranged and compressed.

"And the omission of jagir lands in Statement B. in Akola and Buldana raises the doubt whether they can have been included in this statement in other districts. If they have, the statistical returns of jagir villages are much more full than, judging from the facts stated in paragraph 5 of this chapter, I should have supposed them to be.

"I will not dwell further on figures, the accuracy of which might be in some districts doubtful, but will merely invite the attention of deputy commissioners to the doubt expressed above, and ask them next year to present figures which shall be thoroughly reliable regarding the occupied area left under grass. Information on this point is, I need scarcely say, of very great importance."

According to the Commissioner's Revenue Report for 1876-77, the following was the extent of land under irrigation, and these are the figures which I adopted, viz. —

	Rice Land Acres.	Irrigated Land Acres.	Total Acres.
Amraoti - - -	1,930	13,756	15,686
Akola - - -	508	20,226	20,734
Ellichpur - - -	7,810	8,633	16,443
Buldana - - -	2,470	25,164	27,634
Wun - - -	1,471	3,908	5,379
Basim - - -	7,256	8,554	15,810
Total - - -	21,445	80,241	101,686

AREA under IRRIGATION in 1877-78.

	Rice Land Acres.	Irrigated Land.	Total.
Amraoti - - -	1,051	13,431	14,482
Akola - - -	890	11,250	12,140
Ellichpur - - -	9,030	4,128	13,158
Buldana - - -	6,655	9,507	16,162
Wun - - -	2,973	2,796	5,769
Basim - - -	10,152	8,387	18,539
Total - - -	30,751	49,490	80,250

Deputy commissioners have been asked to furnish information regarding the number of wells in their districts and I hope shortly to receive their reports on this point.

STATEMENT I.

TABLE showing the POPULATION, AREA, LAND REVENUE, &c., of each DISTRICT in the HYDERABAD ASSIGNED DISTRICTS.

Districts.	Population.	* AREA OF LAND IN ACRES.			LAND REVENUE.				Remarks.
		Cultivated.	Arable Uncultivated.	Unculturable, including Land taken up by Rivers, &c.	† Gross Amount Assessed.	Gross Demand of 1876-77.	Deduction on Account of Jaghirs, Village Expenses, &c.	Net Demand in 1876-77.	
Amraoti - - -	501,331	1,390,323	261,376	119,563	Rs. 16,81,537	Rs. 15,62,149	Rs. 2,47,541	Rs. 13,14,608	
Akola - - -	480,657	1,414,784	79,578	204,118	1,098,510	17,58,647	18,19,493	2,79,249	15,40,184
Ellichpur - - -	279,022	619,091	318,688	660,712	1,598,491	9,49,515	9,48,199	1,67,835	7,80,314
Buldana - - -	366,309	1,331,871	211,819	253,075	1,796,765	10,01,642	9,55,046	1,78,026	7,77,020
Wun - - -	323,762	1,161,212	318,680	386,869	2,490,731	5,90,030	4,65,849	76,802	3,89,047
Basim - - -	276,573	1,192,510	227,133	473,021	1,892,984	6,86,509	5,77,859	1,24,680	4,53,170
Total - - -	2,227,654*	7,109,991†	1,447,294	2,691,390	11,248,675	66,67,990	63,28,535	10,74,192	52,51,343

* These are the Census figures of 1867, as modified by subsequent territorial changes.

† Including jaghirs.

‡ Jaghirs have not been assessed.

STATEMENT II.

GENERAL STATEMENT showing the AVERAGE PRODUCE and estimated LOCAL CONSUMPTION, with amount available for EXPORT.

District.	Average Cultivated with Edible Grains in Acres.			Total Average Cultivated with Edible Grains.	Average Produce per Acre in Lbs.			Produce of each Grain in Maunds.			Local Consumption in Maunds.			Available for Export.		Remarks.
	Jowari.	Wheat.	Other Grains.		Jowari.	Wheat.	Other Grains.	Jowari.	Wheat.	Other Grains.	Food at 5 Maunds per Head per Annum.	Seed at 12 Maunds per Acre.	Total.	Maunds.	Tons.	
Amraoti - - -	490,375	115,811	35,464	641,650	420	250	250	2,674,467	302,100	110,824	2,506,655	96,247	2,602,902	544,498	19,446	
Akola - - -	471,559	65,850	74,469	611,678	420	250	250	2,454,633	207,087	232,715	2,403,285	91,752	2,495,037	399,098	14,286	
Ellichpur - - -	199,370	43,649	47,454	290,473	420	250	250	1,016,691	136,403	148,294	1,305,110	43,571	1,438,681	—	—	
Buldana - - -	348,384	137,221	143,740	629,345	420	250	250	1,804,561	426,712	449,168	1,831,545	94,492	1,925,947	754,494	26,946	
Wun - - -	439,886	32,708	36,886	509,480	420	250	250	2,308,410	102,211	115,185	1,618,810	76,422	1,695,232	830,574	29,663	
Basim - - -	296,182	103,009	124,308	523,589	420	250	250	1,530,401	322,184	388,567	1,382,865	73,538	1,461,403	779,719	27,848	
Total in province	2,245,556	498,338	462,321	3,206,215	420	250	250	11,780,163	1,557,306	1,444,753	11,138,270	480,932	11,619,202	3,172,920	113,286	

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BOMBAY.

STATEMENT III.

STATEMENT showing the PROGRESS of CULTIVATION during the year 1877-78.

Classification of Area.	Area.	Un-culturable Area.	Balance or Culturable Area.	Details of Column 5.				Per-centage of column 6 to column 4.	
				Uncultivated.		Cultivated.			
				1876-77.	1877-78.	1876-77.	1877-78.	1876-77.	1877-78.
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
Reserved Forests -	730,101	541,453	188,644	177,866	178,383	11,438	10,259	6.0	5.4
Integral waste villages -	399,698	255,774	143,920	144,528	143,920	95	...	...	...
Izara villages -	887,721	400,077	487,649	3,788	161,922	467,108	325,725	95.8	66.8
Jagir do. -	380,546	115,255	265,288	36,322	36,977	236,976	228,306	89.3	86.6
Other do. -	8,852,596	1,482,194	7,370,397	1,090,471	1,028,361	6,180,911	6,342,035	83.8	86.0
Palampur do. -	7,444	2,180	5,264	...	...	5,264	...	100.0	100.0
Grand Total -	11,258,126	2,796,933	8,461,164	1,452,475	1,549,563	6,901,702	6,911,589	81.5	81.7

STATEMENT IV.

Showing the ACREAGE under each kind of Crop in 1877-78.

Grain.	Acreage.	Per-centage.	Grain.	Acreage.	Per-centage.
KHARIF CROP.			RABI CROP—cont.		
Rice -	30,751	0.48	Lac -	65,155	1.01
Joar -	2,598,041	40.15	Linseed -	216,891	3.35
Bajra -	157,571	2.44	Kwido -	58,192	0.90
Tur -	90,269	1.40	Wattana -	21,192	0.33
Urd -	18,099	0.28	Masur -	28,941	0.45
Moong -	4,781	0.07	Gudmul -	51	—
Cotton -	2,078,269	32.12	Til -	825	0.01
Til -	154,553	2.39	Coriander -	1,506	0.02
Tobacco -	17,060	0.26	Opium -	1,887	0.03
Kurhal -	37,416	0.58	Joar -	6,768	0.10
Indigo -	188	—			
Bhadli -	21,970	0.34	GARDEN PRODUCE.		
Mudie -	6,339	0.09	Lemons -	103	—
Ralla -	357	0.01	Guavas -	724	0.01
Kulthi -	108	—	Plantains -	1,990	0.03
Hulgar -	1,025	0.02	Yams -	211	—
Rajgeera -	34	—	Flowers -	23	—
Kutki -	61,742	0.95	Vegetables -	9,314	0.14
Chillies -	19,483	0.30	Grapes -	1	—
Savree -	2,208	0.03	Garden produce -	11,576	0.18
Ajwan -	40	—			
Castor Seed -	10,490	0.16	MISCELLANEOUS.		
Kodo -	1,029	0.02	Beetel leaves -	1,622	0.03
Ganja -	74	—	Sweet potatoes -	392	0.01
Walkat -	49	—	Ginger -	9	—
Ground Nut -	2,146	0.03	Cummin -	10	—
Malze -	1,639	0.03	Sugar-cane -	4,772	0.07
Turmeric -	2,389	0.04	Jira -	47	—
Brinjals -	3,401	0.05	Alli -	15,942	0.25
Hemp -	13,940	0.22			
RABI CROP.			Total cultivation -		
Wheat -	524,454	8.11		6,470,186	100
Gram -	162,184	2.51			

BOMBAY.

The following statistics will be found in a tabulated form in the Appendix of the Bombay Administration Reports. They are compiled from the returns kept in the villages and talukas. The return of culturable land is accurate and the others approximate.

1. The extent of each description, i.e., irrigated dry crop, &c. of assessed culturable land in the Government villages of each district, with the cultivated area of the year, and that of the previous year for comparison.

2. The area on which each of the products of each district was cultivated in the year of report.

3. Extent of land under cotton, and quantity of clean cotton realised.

4. Prices of the products at each place.

The following statement, compiled from the Administration and Jumabandy Reports, shows the culturable area of Government land (figures are not available for alienated land), the area in occupation, and the area cropped in a good average year, 1873-74:

AGRICULTURAL STATISTICS.

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GOVERNMENT LAND CULTIVATION STATEMENT, 1873-74.

No.	District.	Culturable Government Acres.	Occupied Acres.	Deduct Fallow Acres and Grass Land.	Leaves Cropped Acres.	Add twice Cropped Acres.	Total Cultivation.
1.	2.	3.	4.	5.	6.	7.	8.
1	Ahmedabad -	13,24,083	9,51,738	34,260	9,17,478	9,929	9,27,407
2	Kaira -	7,60,200	5,56,737	55,042	5,01,695	18,735	5,20,430
3	Panch Mahals* -	4,77,238	4,54,045	63,202	3,90,843	271	3,91,114
4	Broach -	7,51,899	6,37,929	2,12,518	4,25,411	37,723	4,63,134
5	Sur -	10,35,021	9,77,227	4,52,291	5,24,936	5,312	5,30,248
6	Tana -	4,74,495	4,72,674	2,03,176	2,69,498	7,274	2,76,772
7	Kolaba -	20,23,744	15,97,752	2,07,770	13,89,982	6,635	13,96,617
8	Nasik -	34,40,815	23,63,093	2,28,838	21,34,255	1,258	21,35,513
9	Khandesh -	25,56,826	24,48,750	2,74,656	21,74,094	—	21,74,094
10	Ahmednagar -	19,40,165	19,01,205	1,88,721	17,12,484	14,342	17,26,826
11	Poona -	19,52,916	19,41,633	1,69,370	17,72,263	—	17,72,263
12	Sholapur -	16,79,826	16,58,080	2,45,772	14,12,308	41,939	14,54,247
13	Satara -	20,74,227	20,12,036	51,151	19,60,885	752	19,61,637
14	Kaladgi -	11,90,123	11,13,083	1,30,810	9,82,273	3,602	9,85,875
15	Belgaum -	16,14,766	15,23,430	1,46,486	13,76,944	1,262	13,78,206
16	Dharwar -	9,23,678	9,90,185	3,361	9,86,824	14,175	10,00,999
17	Ratnagiri -	—	—	—	—	—	—
18	Kanara -	—	—	—	—	—	—
	Total -	2,42,20,022	2,15,99,597	26,67,424	1,89,32,173	1,63,209	1,90,95,382

* Separate figures for the Panch Mahals are not available. Returns for Kanara are not prepared. As the survey has only been partially introduced, information for the whole district is not available.

Of the 1,90,95,382 acres shown as cropped, the principal food grains occupied the following areas:—

	Acres.
Jowari -	63,37,549
Bajra -	38,66,916
Wheat -	12,23,736
Rice -	11,32,816
	1,25,61,017

Cotton occupied 17,37,529 acres.

The following statement, compiled from the Revenue Commissioner's Returns, shows the comparative areas under the principal food grains as compared with cotton, from 1860 to 1874:—

Year.	Jowari.	Bajri.	Wheat.	Rice.	Principal Food Grains.	Cotton.	
						Cotton Department's Figures, including Cultivation in Native States and Alienated Lands.	Revenue Commissioner's Figures, showing Cultivation in Government Lands only.
1860-61	49,96,062	32,44,825	10,67,216	6,20,804	99,28,907	10,22,244	10,02,196
1861-62	50,33,113	32,87,121	10,60,968	6,52,573	1,00,33,775	11,43,096	11,40,434
1862-63	55,45,852	25,11,295	14,26,566	7,05,611	1,01,89,324	12,96,773	13,09,484
1863-64	52,39,527	32,08,427	13,38,934	7,28,587	1,05,15,475	17,82,174	15,17,321
1864-65	54,71,488	33,80,708	11,71,260	7,38,753	1,07,62,209	22,34,300	15,73,447
1865-66	59,70,598	34,58,587	12,07,382	7,58,859	1,13,95,426	16,48,717	11,86,097
1866-67	56,55,887	35,58,036	12,93,385	12,28,518	1,17,35,826	19,56,568	14,35,183
1867-68	57,31,923	37,39,050	13,30,896	11,83,687	1,19,85,556	19,61,078	14,36,735
1868-69	59,19,565	39,61,581	11,36,319	10,78,647	1,20,96,112	19,47,511	14,36,613
1869-70	51,38,693	46,93,079	9,66,236	11,04,490	1,19,02,498	27,80,744	19,78,711
1870-71	58,50,389	38,29,953	11,91,474	11,95,477	1,20,67,293	25,21,357	18,42,731
1871-72	71,66,951	29,06,493	10,24,969	10,95,510	1,21,93,923	19,82,493	14,46,959
1872-73	59,44,992	44,65,253	10,47,266	11,48,138	1,26,05,649	21,18,403	15,87,731
1873-74	63,37,549	38,66,916	12,23,736	11,32,816	1,25,61,017	22,66,382	17,37,529
Total	8,00,02,589	5,01,11,324	1,64,86,607	1,33,72,470	15,99,72,990	2,66,61,840	2,06,31,171
Average	57,14,470	35,79,380	11,77,615	9,55,176	1,14,26,642	19,04,417	14,73,655

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The following facts are furnished by the collectors as to the production per acre and the consumption and export of grain:—

District.	Average Amount of Food Grains produced per Acre.	Disposal of Crop. Amount of Local Consumption, Surplus Exported, or Deficiency Imported.	District.	Average Amount of Food Grains produced per Acre.	Disposal of Crop. Amount of Local Consumption, Surplus Exported, or Deficiency Imported.
Kaira	Bengal maunds. Seers. Wheat - 4 24 Rice - 8 58 Bajra - 5 6 Grain - 3 72	Bajra is largely produced. Kaira exports grain and tobacco. The people eat bajra, rice, and the coarser millets. The export of grain by railway in 1876 was 21,344 tons.	Sholapur	- - -	Sholapur exports grain in average years.
Surat	- - -	Rice and jowari are the principal products, covering about 21 and 18 per cent. respectively of the cultivated area. Cotton covers about 15 per cent. Surat exports surplus grain.	Kaladgi	Jowari - 292½ lbs. Bajra - 218½ " Wheat - 286½ "	The production is much greater than the consumption, and a large residue remains for export or storage. In ordinary years none of the staple grains (jowari, bajra, wheat) is ever imported, though rice is for the higher classes.
Broach	- - -	The principal food products are jowari, wheat, bajra, and pulses. Cotton occupies 44·71 per cent. of the area. Both cotton and grain are exported.	Satara	Jowari - 2 maunds Bajra - 1 m. 10 lbs.	The whole food grain produced is consumed in Satara, and rice is imported from the Concan.
Thana	Bengal maunds. Seers. Rice - 12 0	Rice is the staple product. It is stated that about 48 lakhs of maunds are consumed and 12 lakhs exported.	Dharwar	- - -	- - -
Khandesh	Wheat - 2 79 Rice - 2 36 Jowari - 2 28 Bajra - 2 16	The principal food products are bajra, jowari, and wheat. Khandesh exports a surplus.	Colaba	Rice - 20 maunds Nagli - 8 "	There is a yearly surplus of produce after supplying the consumption of the people.
Nassick	- - -	Bajra and wheat are the principal products. After all the wants of the people have been supplied, a considerable quantity of wheat and bajra is available for export in a good season.	Ratnagiri	- - -	The hill crops (warkas) are nagli, wari, and harik, which the people eat. Ratnagiri does not grow enough food for its population, but depends on imports from Bombay by sea and from the Deccan by land. In 1862, a year of scarcity in the Deccan, the people of Ratnagiri were reduced to straits by the exportation of their stocks to the Deccan before the monsoon.
Poona	Bengal maunds. Seers. Wheat - 4 0 Bajra - 4 0 Jowari - 4 0 Rice - 10 0	Bajra and jowari are the principal products. Surplus grain is exported from Poona.	Canara	- - -	The chief product is rice, the surplus of which is exported.

SINDH.

Col. Haig.

5. The average area under cultivation yearly in each district is as under:—

	Food Crops.	Other Products.	Total Acres.
	Acres.	Acres.	
Frontier Districts	134,199	49,837	183,556
Shikarpur	644,072	119,181	763,255
Hyderabad	408,936	125,594	534,530
Kurrachee	276,293	79,824	356,117
Thar and Parkar	240,854	62,587	303,441
Total	1,704,355	436,574	2,140,928

6. The various food crops are grown in the province to the following extent, and with the following average yield:—

	Acres.	Average Yield per Acre.	Total Produce.
		Maunds.	Maunds.
1. Joar	450,829	9	40,57,461
2. Bajra	405,626	8	32,45,008
3. Wheat	313,977	10	31,39,770
4. Gram	20,698	6	1,24,188
5. Rice (dressed)	486,275	8	38,90,800
6. Barley	17,078	9	1,53,102
7. Mung and Urad	9,272	6	55,632
Total	1,704,355	—	1,46,71,301

SINDH.

7. The areas given in the two preceding paragraphs are the average of seven years ending 1876-77, and are taken from the annual Revenue Reports of the Commissioner in Sind. I am inclined to think, however, that they overstate actual cultivation. The yield per acre is what is generally allowed to be a fair average for Sind. If we take the annual consumption of food grains at 6 maunds per head, the requirements of the population (2,192,435) are 1,31,54,610 maunds, which would leave, supposing the estimate of produce under paragraph 6 to be near the truth, 15,16,751 maunds available for export. As a fact every taluka in the province exports produce, and the average annual export from the province of grain and pulse, considered to be the produce of Sind, has for the last five years been 11,57,807 maunds, which leaves 3,58,944 maunds as a reserve.

MADRAS.

The Board of Revenue.

Statistics of acreage under the several kinds of crops are available only for lands held under ryotwari and inam tenures in this presidency. No attempt has been made to collect statistics as regards the acreage of crops in zemindari lands, as it is impossible to procure reliable statistical information in such tracts in

MADRAS.

the absence of any well constituted and trustworthy agency suited to the purpose. The following statement shows the average acreage under the principal kinds of crops in ryotwari and inam lands in each district:—

STATEMENT showing the AVERAGE ACREAGE under Crops during the four Years ending Fasli 1285 (1875-76) in the Madras Presidency (Inam and Ryotwari Lands).

Districts.	FOOD GRAINS OR CORN CROPS.												SPECIAL CROPS.					Total Area under all Crops.	
	Rice.		Cholum.	Ragi.	Varagu or Aricalu.	Cumbu.	Koratu or Tenay.	Millet or Samal.	Pulses.	Miscellaneous Crops.	Total.	Green and Garden Crops.	Seeds.	Tupes and Orchards.	Cotton.	Indigo.	Other Crops.		Total.
	One Crop Irrigated.	Second Crop Irrigated.																	
Ganjam	Acres. 119,000	Acres. 16,000	Acres. 1,100	Acres. 73,000	Acres. —	Acres. 6,000	Acres. —	Acres. 1,500	Acres. 32,000	Acres. 8,000	Acres. 375,000	Acres. 10,000	Acres. 21,000	Acres. 10,000	Acres. 3,600	Acres. —	Acres. —	Acres. 424,000	
Vizagapatam	37,000	—	2,000	10,000	2,000	25,000	1,000	3,000	5,000	2,000	82,000	3,000	—	—	4,000	—	—	4,000	115,000
Godavari	425,000	2,000	99,000	18,000	3,000	9,000	9,000	9,000	92,000	22,000	763,000	27,000	114,000	114,000	21,000	21,000	3,000	20,000	903,000
Kistna	213,000	1,000	125,000	20,000	133,000	140,000	50,000	—	25,000	163,000	1,653,000	48,000	122,000	122,000	10,000	240,000	38,000	2,000	2,110,000
Nellore	214,000	6,000	8,000	37,000	80,000	62,000	10,000	—	63,000	104,000	941,000	20,000	47,000	—	16,000	51,000	—	—	1,075,000
Cuddapah	127,000	27,000	4,000	467,000	38,000	370,000	167,000	31,000	185,000	20,000	1,508,000	17,000	44,000	21,000	66,000	56,000	—	—	1,734,000
Bellary	107,000	36,000	5,000	1,167,000	13,000	223,000	—	680,000	408,000	59,000	2,888,000	34,000	176,000	47,000	380,000	6,000	1,000	—	3,523,000
Kurnool	48,000	9,000	9,000	862,000	21,000	94,000	330,000	—	151,000	51,000	1,714,000	30,000	79,000	—	230,000	42,000	—	—	2,065,000
Madras	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Chingleput	320,000	49,000	45,000	33,000	40,000	15,000	—	—	4,000	2,000	531,000	9,000	16,000	28,000	—	12,000	—	—	596,000
North Arcot	397,000	80,000	6,000	96,000	65,000	97,000	1,000	7,000	45,000	3,000	630,000	19,000	67,000	15,000	—	18,000	—	—	739,000
South Arcot	319,000	51,000	46,000	135,000	195,000	232,000	—	6,000	24,000	3,000	1,044,000	20,000	85,000	26,000	26,000	81,000	—	—	1,282,000
Tanjore	877,000	45,000	59,000	54,000	121,000	47,000	—	—	28,000	10,000	1,377,000	48,000	16,000	—	4,000	1,000	—	—	1,806,000
Trichinopoly	125,000	16,000	16,000	102,000	160,000	164,000	1,000	31,000	74,000	—	893,000	23,000	41,000	8,000	37,000	1,000	—	—	1,003,000
Madura	134,000	80,000	3,000	105,000	89,000	115,000	9,000	104,000	66,000	17,000	871,000	17,000	38,000	5,600	50,000	—	1,000	—	982,000
Tinnevely	192,000	28,000	—	56,000	62,000	232,000	1,000	159,000	35,000	6,000	912,000	55,000	55,000	19,000	178,000	—	3,000	—	1,292,000
Coimbatore	71,000	19,000	1,000	229,000	8,000	774,000	40,000	90,000	232,000	9,000	2,135,000	67,000	89,000	5,000	215,000	—	2,000	—	2,407,000
Nilgiris	—	—	—	4,000	—	—	13,000	6,000	—	13,000	35,000	2,900	1,000	—	—	—	—	—	51,000
Salem	87,000	19,000	15,000	375,000	92,000	316,000	15,000	67,000	242,000	13,000	1,845,000	30,000	111,000	7,000	11,000	2,000	1,000	—	1,505,000
South Canara	200,000	176,000	110,000	4,000	—	—	—	—	43,000	1,000	534,000	8,000	5,000	33,000	—	—	1,000	—	531,000
Malabar	392,000	110,000	81,000	1,621,000	—	—	—	—	—	5,000	591,000	—	26,000	255,000	1,507,000	—	35,000	—	2,904,000
Total	4,387,000	755,000	678,000	4,668,000	1,249,000	2,050,000	587,000	1,203,000	2,160,000	510,000	20,081,000	457,000	1,169,000	510,000	1,507,000	311,000	76,000	—	21,711,000

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The average has been taken on the area under crop during the four years ending 1875-76, which embraces two good and two indifferent agricultural seasons.

The area under crop in ryotwari and inam lands for the whole presidency amounts to nearly 24½ million acres, inclusive of second crop cultivation to the extent of a little over 2½ million acres. Of this area food grains occupy upwards of 20½ million acres, green and garden crops nearly half a million, oil seeds, &c. upwards of a million, topes and orchards half a million, cotton a million and a half, and indigo and other special crops a little less than half a million.

For zamindari lands, as already observed, no cultivation accounts are received excepting from a few districts in which zamindari cultivation is comparatively unimportant, and recourse must therefore be had to a rough estimate.

In Statement No. IV., prepared in connection with the Census of 1871, and printed in the Board's Proceedings, forming an annexure to the reply to question 10, the zamindari cultivated acreage is shown as given by the returns furnished by the zamindars, but the statement is not complete, as the necessary particulars for the large zamindaris of Shivaganga and Ramnad in the Madura District, Venkatagiri Zamindari and Pamur taluk of Kalahasti Zamindari in Nellore, and the Jeypore zamindari in Vizagapatam are omitted. The entries in the statement are not perfectly trustworthy, but the Board believe they are sufficiently correct to form the basis of a rough calculation, and no better data are available.

The following statement of zamindari cultivation has been framed on the basis of the above statement. For districts in which the zamindari cultivation has been reported by collectors, their figures have been adopted, and for the others it has been considered that for the purpose of a rough calculation the proportion of cultivated to total area may be assumed to be the same as the corresponding proportion for the remainder of the district in which they are situated :—

Cultivation in Zamindari Tracts.

Ganjam, exclusive of the
Malahs - - - - - 733,000

Districts.	FOOD GRAINS OR CORN CROPS (ZEMINDARI LANDS).											
	Rice.			Cholum.	Ragi.	Varagu or Aricalu.	Cumboo.	Koratu or Tenay.	Samai.	Pulses.	Miscella- neous.	Total.
	One Crop Irrigated.	Second Crop Irrigated.	Un- irrigated.									
Ganjam	344,000	23,000	76,000	2,000	126,000	—	10,000	—	2,000	55,000	5,000	648,000
Vizagapatam	313,000	—	18,000	19,000	232,000	9,000	28,000	40,000	18,000	40,000	—	825,000
Godavari	237,000	1,000	55,000	42,000	10,000	2,000	5,000	5,000	5,000	51,000	13,000	426,000
Kistna	54,000	—	31,000	131,000	5,000	33,000	38,000	13,000	—	71,000	42,000	418,000
Nellore	170,000	5,000	6,000	233,000	29,000	63,000	49,000	8,000	—	50,000	82,000	745,000
Cuddapah	—	—	—	—	—	—	—	—	—	—	—	—
Bellary	1,000	—	—	15,000	1,000	—	3,000	—	—	—	—	—
Kurnool	1,000	—	—	24,000	1,000	4,000	3,000	9,000	—	6,000	1,000	36,000
Madras	—	—	—	—	—	—	—	—	—	—	—	—
Chingleput	42,000	6,000	—	—	—	—	—	—	—	—	—	—
North Arcot	105,000	42,000	6,000	1,000	5,000	6,000	2,000	—	—	1,000	—	69,000
South Arcot	2,000	—	—	12,000	51,000	35,000	52,000	—	—	24,000	2,000	330,000
Tanjore	18,000	—	7,000	1,000	1,000	2,000	—	—	—	—	—	7,000
Trichinopoly	11,000	4,000	2,000	20,000	14,000	21,000	21,000	—	—	3,000	1,000	66,000
Madura	131,000	29,000	3,000	192,000	106,000	87,000	113,000	9,000	4,000	102,000	65,000	854,000
Tinnevelly	24,000	2,000	—	68,000	27,000	12,000	233,000	1,000	—	5,000	—	407,000
Coimbatore	—	—	—	—	—	—	—	—	—	—	—	—
Nilgiris	—	—	—	27,000	3,000	—	18,000	1,000	—	—	—	58,000
Salem	30,000	7,000	—	—	—	—	—	—	—	—	—	—
South Canara	—	—	—	25,000	127,000	31,000	118,000	5,000	23,000	82,000	4,000	457,000
Malabar	2,000	—	—	—	—	—	—	—	—	—	—	2,000
Total	1,515,000	125,000	212,000	862,000	601,000	333,000	900,000	63,000	247,000	496,000	197,000	5,563,000

It is almost needless to remark that no very great accuracy is claimed for the above estimates.

	Acre.
Vizagapatam, exclusive of Jeypore Zemindari	1,181,000
Godavari	541,000
Kistna	534,000
Nellore	852,000
Cuddapah	—
Bellary (Sundoor)	44,000
Kurnool (Banganapally)	58,000
Madras	—
Chingleput	77,000
North Arcot	393,000
South Arcot	9,000
Tanjore	72,000
Trichinopoly	159,000
Madura	964,000
Tinnevelly	625,000
Coimbatore	61,000
Nilgiris	—
Salem	511,000
South Canara	—
Malabar	3,000
Total	6,817,000

The total cultivated area of the presidency under crops of all kinds may thus be taken at 31½ million acres.

With regard to the distribution of the different crops in the zamindari cultivated area there is as a rule absolutely no information, but there is no reason to suppose that it is very different from that found to exist as regards Government and inam lands, distribution of crops being affected more by the climate and rainfall than by the conditions of tenure under which lands are held. The following table of the distribution of food crops in zamindari lands in each district has been prepared on the supposition that the proportion of the acreage of each kind of crop is the same for zamindari as for ryotwari and inam lands which, being situated in the same district, are influenced by the same climate and rainfall and as a consequence by the same methods of cultivation :—

The total area under food grains in the presidency in all kinds of lands may then be estimated as follows :—

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Districts.	FOOD OR GRAIN CROPS, RYOTWARI, INAM, AND ZEMINDARI LANDS.											
	Rice.			Cholum.	Ragi.	Varagu or Aricalu.	Cumboo.	Koratu or Tenay.	Samai.	Pulses.	Miscella- neous.	Total.
	First Crop Irrigated.	Second Crop Irrigated.	Un- irrigated.									
Ganjam	543,000	44,000	120,000	2,000	103,000	21,000	257,000	10,000	31,000	51,000	20,000	1,023,000
Vizagapatam	880,000	—	20,000	21,000	103,000	23,000	14,000	14,000	11,000	143,000	35,000	1,189,000
Godavari	682,000	3,000	154,000	649,000	25,000	108,000	187,000	63,000	—	352,000	211,000	2,077,000
Kistna	297,000	1,000	156,000	640,000	65,000	143,000	111,000	18,000	—	113,000	186,000	1,686,000
Nellore	384,000	11,000	14,000	640,000	65,000	143,000	111,000	18,000	—	113,000	186,000	1,686,000
Cuddapah	127,000	27,000	4,000	467,000	130,000	38,000	370,000	107,000	31,000	185,000	20,000	1,506,000
Bellary	108,000	36,000	5,000	1,172,000	111,000	13,000	235,000	60,000	60,000	639,000	2,224,000	1,761,000
Kurnool	40,000	9,000	9,000	886,000	22,000	14,000	97,000	339,000	—	155,000	52,000	1,761,000
Madras	—	—	—	—	—	—	—	—	—	—	—	—
Chingleput	302,000	55,000	51,000	9,000	44,000	55,000	17,000	—	—	5,000	2,000	600,000
North Arcot	302,000	122,000	9,000	35,000	147,000	100,000	149,000	1,000	11,000	69,000	5,000	950,000
South Arcot	321,000	51,000	46,000	23,000	156,000	197,000	221,000	—	6,000	24,000	3,000	1,051,000
Tanjore	895,000	45,000	66,000	15,000	38,000	145,000	57,000	—	—	31,000	11,000	1,091,000
Trichinopoly	130,000	59,000	18,000	176,000	125,000	181,000	185,000	1,000	35,000	81,000	34,000	1,725,000
Madura	205,000	59,000	6,000	888,000	214,000	176,000	228,000	38,000	206,000	131,000	17,000	1,879,000
Tinnevelly	216,000	30,000	—	140,000	83,000	74,000	465,000	2,000	224,000	119,000	9,000	2,103,000
Coimbatore	71,000	19,000	—	680,000	233,000	8,000	792,000	41,000	104,000	236,000	9,000	1,800,000
Nilgiris	—	—	—	—	—	—	—	—	—	—	—	—
Salem	117,000	26,000	20,000	100,000	500,000	123,000	464,000	20,000	90,000	324,000	16,000	1,800,000
South Canara	200,000	176,000	110,000	—	—	—	—	—	—	—	—	—
Malabar	394,000	110,000	81,000	—	—	—	—	—	—	—	—	—
Total	5,802,000	883,000	890,000	5,530,000	2,232,000	1,588,000	3,859,000	647,000	1,450,000	2,656,000	707,000	26,244,000

The Board have experienced very great difficulty in endeavouring to arrive at an estimate of the ordinary average yield per acre of the different kinds of crops. With such an almost infinite variety of soils distributed in different proportions throughout the different districts, the assumption of any general average for the whole presidency may lead to very fallacious results unless the rate assumed is based on an extensive series of observations of each class of land in each district for a large number of seasons. For the districts recently settled by the Revenue Settlement Department, however, an attempt was made to ascertain the yield of different classes of land by actual experiments. In some cases the experiments extended over a large number of years, and the

results were accepted in making the settlement as affording a sufficiently true index to the average yield. In other cases where the experiments had not been spread over a sufficiently long period for the elimination of variations arising from ordinary fluctuations of season, a rate was assumed by the settling officers on a joint consideration of the experimental results and the known circumstances of the tract dealt with. For districts not settled there is no information, and the only guide is the estimates furnished by the local officers on general local inquiry. The following statement shows the average yield as estimated by the Settlement Department for the settled districts, and by the collectors for the others :—

Districts.	FOOD GRAINS.										Remarks.
	Paddy.		Cholum.	Ragi.	Varagu or Aricalu.	Cumboo.	Koralu or Tenay.	Samai.	Pulses.	Miscel- laneous.	
	One Crop Irrigated.	Unirri- gated.									
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	
Ganjam - -	1,344	—	—	798	—	—	—	—	—	—	* Horse gram
Godavari - -	1,938	1,525	1,421	1,743	—	1,104	—	—	—	453*	
Kistna - -	2,015	950	992	—	960	562	—	—	—	—	
Nellore - -	1,615	—	459	—	736	429	—	—	—	—	
Kurnool - -	2,100	—	551	—	—	—	381	—	—	—	
Cuddapah (seven taluks).	2,197	—	551	657	—	341	423	300	—	300†	† Ariga.
Chingleput - -	1,219	—	—	474	819	—	—	—	—	—	
South Arcot (Chilam- baram).	1,809	—	1,013	922	1,485	921	—	—	—	—	
Salem - -	1,833	—	939	945	—	802	—	—	—	—	
Coimbatore (five taluks).	1,750	—	521	496	—	479	—	—	—	—	
Trichinopoly - -	1,678	—	600	831	1,208	638	—	—	—	—	
Tinnevely - -	1,784	—	—	900	—	900	—	—	—	600†	† Horse gram
Vizagapatam - -	2,400	—	—	500	—	230	—	—	—	165	
Bellary - -	(rice) 900	—	320	600	—	709	—	—	—	650	
North Arcot - -	2,500	—	630	504	672	504	—	—	—	—	
Tanjore - -	1,440	667	—	—	—	—	—	—	—	—	
Madura - -	(rice) 1,930	—	1,170	1,170	—	1,170	—	—	—	—	
Collector - -	—	—	574	763.	486	328	380	358	500	—	
Sub-Collector - -	820	—	—	—	—	—	604	650	—	1,100‡	‡ Gangee and wheat.
Nilgiris - -	—	—	357	—	—	—	—	—	—	—	
South Canara - -	(rice) 1,008	(rice) 472	—	—	—	—	—	—	—	—	
Malabar - -	1,000	—	—	—	—	—	—	—	—	—	

The rates given as averages by the Settlement Department have been arrived at on a careful calculation of the proportions of the land of different classes of soils under cultivation in each district. Taking all the tracts settled by the Revenue Settlement Department as a whole, and taking into account also the acreage of each kind of crop, the average yield per acre comes out as follows :—

	Lbs.
Paddy	1,621
Cholum	666
Ragi	770
Korra	400
Cumbu	630
Varagu	950

	Lbs.
Ariga	500
Unirrigated paddy	1,330
Horse gram	600

The portion of the presidency in which settlement operations have been completed or are in progress comprise a sufficiently large extent of country to represent fairly the varying conditions of the different parts of the presidency with the exception of the two West Coast Districts.

Mr. Benson, the acting superintendent of Government Farms, in a memorandum on this question submitted to Mr. Ballard, estimates the average out-turn at—

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	Per acre.
Paddy	1,008
Unirrigated—	
Cereals	616
Pulses	448

Although this estimate is based on a consideration of Settlement Reports and other observations in connection with the district of Chingleput, in which agricultural conditions are in many ways singularly unfavourable, Mr. Robertson, the superintendent of the Government Farms, considers even Mr. Benson's estimates to be too high. He bases this opinion on a statement of produce furnished by the Collector of Coimbatore for Fasli 1284, in which the rates of out-turn are all lower than those given by Mr. Benson, except as regards paddy, and he is of opinion that the Coimbatore District may be taken as fairly representing the average agricultural conditions of the entire presidency. In support of this statement he gives the following table :—

	Coimbatore.	Whole Presidency.
Population per square mile	237.3	226.2
Houses	43.6	45.0
Persons per house	4.88	5.02
Incidence of land revenue per head of the population.	Rs. 1 6 8	Rs. 1 6 8
Assessment per acre—		
Wet	7 5 0	4 9 0
Dry	0 14 3	1 1 0
Per-centage to total cultivation of area under—		
Cereals	77.89	76.28
Pulses	8.00	9.05
Oil seeds	3.44	5.54
Indigo	1.10	1.10
Cotton, other special crops	8.81	6.14
Garden crops	1.96	1.89

The statement of the out-turn of produce furnished by the Collector of Coimbatore is evidently based on the rough estimates of tahsildars, and in itself is not entitled to any special weight. Independently of this, the Board doubt whether Coimbatore can be regarded as fairly representing, for the purpose in question, the average agricultural condition of the presidency. The two most important considerations which affect the out-turn of produce are the rainfall and the nature of the soil, and in both these respects Coimbatore is below the average of the presidency. Mr. Wedderburn, the late collector of Coimbatore, who was intimately acquainted with the district, writes: "I have not seen any exceptional soils in this district, though I have been over every taluk of it, and my impression of it after seven years, is that it is singularly unfavoured; rainfall scanty and ill-distributed; raging winds blow for half the year; a full crop dependent on rainfall is, I am convinced, the exception, and half or quarter the average."

Referring to Mr. Robertson's table, it seems to the Board that the proportions of area under cereals, &c. do not prove anything with respect to the out-turn, and the density of population is influenced by a variety of causes. The old assessments were not fixed throughout the presidency on a uniform principle, but even supposing them to be a tolerably good guide to the comparative yield of lands in different districts, the fact that nearly the whole of the cultivation (96 per cent.) is unirrigated in the Coimbatore District, and that the average unirrigated rate for Coimbatore is less than the average rate for the whole presidency by nearly 18 per cent. would seem to point to a conclusion somewhat different from that drawn by Mr. Robertson, who, however, has not failed to point to the fact of the irrigated assessment being above the average as a reason for considering the yield of paddy to be exceptionally high. It is also noteworthy that the proportion of poor ryots in the Coimbatore District is considerably above the average of the presidency, the number of registered puttadars paying less than 10 rupees assessment being 71 per cent. in that district against 64 per cent. for the presidency generally. The average assessment of a

holding in Coimbatore District is also low, being rupees 11-9-10 against rupees 15-10-11 for the presidency, notwithstanding the fact that nearly half the puttas in Coimbatore are joint puttas.

As already remarked, the Board are sensible that, unless extensive observations are conducted for a long series of years all over the presidency, there must be more or less of uncertainty in all calculations of out-turn of produce; but they consider that the out-turn on which the assessment imposed by the Revenue Settlement are based must, in the present state of knowledge, be accepted for the districts concerned as the nearest approximation to the truth.

Turning to the estimates furnished by collectors for districts not settled, the Board consider that, though they are entitled to much less weight than the settlement out-turn, they may generally be accepted for present purposes. The fact that they differ widely is no argument for their rejection, as the settlement averages show that the out-turns of different districts vary within wide limits as specified below :—

Highest.		Lowest.		
2,197	Chingleput	1,219	Paddy	Cuddapah
1,421	Nellore	459	Cholum	Godavari
1,743	Chingleput	474	Ragi	Do.
1,104	Nellore	429	Cumbu	Do.

In a few instances, however, the collectors estimates seem obviously to require correction.

The out-turn estimated by the Collector of Vizagapatam (2,400 lbs. for paddy) has reference to a "good" crop; but as it is an average out-turn that is required, the Board consider that it will be better to adopt the general settlement average.

In the case of Tanjore, on the other hand, the collector's estimate of the out-turn of paddy, viz., 1,440 lbs. an acre, is evidently too low, as it is less than the general average obtained from the settlement returns. The selling price of land in this district is high; the harvests are generally plentiful owing to the almost never-failing irrigation that is obtained, and to the fertilising alluvial matter brought down by the rivers. There is thus every reason to believe that the out-turn cannot be less than in Godavari, viz., 1,938 lbs., and this rate will therefore be taken as applicable to Tanjore.

The average out-turn of paddy given by the Collector of North Arcot, viz., 2,500 lbs., appears high; but the experiments made by Mr. Rundall, the deputy director of Revenue Settlement, in three taluks of this district gave still higher results, viz., 2,693 lbs., and the collector's estimate may therefore be taken to represent the average for the district. Mr. Rundall attributes the comparatively large yield to the superior mode of cultivation pursued in North Arcot, the land being there invariably manured. For Madura the rate of yield—1,920 lbs. of rice or 2,900 lbs. of paddy, 1,170 lbs. of cholum, ragi, and cumbu—are very high and differ very materially from the sub-collector's estimates, which are given as 820 lbs. for paddy, 574 lbs. for cholum, 763 lbs. for ragi, and 328 lbs. for cumbu. The Board would adopt the general settlement average out-turn in the case of this district. For Malabar the rate of yield is the lowest reported, but the district is a hilly one, and the annual rainfall is sufficiently heavy to permit of rice crops being grown on much poorer land than that usually allotted to rice cultivation elsewhere. As will be seen hereafter, the estimate based on the out-turn reported from Canara goes to show that the district does not support its own population—a result for which the Board was not prepared. The collector's figures, however, are not low, and the error is probably in the statement of the area under crop, the district never having been surveyed.

The gross out-turn of food grain in each district is shown in the following statement, the calculation of the out-turn being based on the rates given by the Settlement Department and by collectors, with the modifications above noted. When for a particular grain the out-turn was not given by collectors, the general settlement average for that grain has been

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taken. The yield of the second crop is assumed to be one half that of the first. For paddy the equivalent in rice has been taken at two-thirds :—

	Tons.
Ganjam	369,000
Vizagapatam	338,000
Godavari	601,000
Kistna	756,000
Nellore	489,000
Cuddapah	377,000
Bellary	796,000
Kurnool	452,000
Chingleput	199,000
North Arcot	440,000
South Arcot	508,000
Tanjore	696,000
Trichinopoly	368,000
Madura	564,000
Tinnevely	444,000
Coimbatore	508,000
Nilgiris	7,000
Salem	647,000
South Canara	163,000
Malabar	175,000
Total	8,897,000

ment Department of the quantity of seed required for sowing an acre of land with paddy is as follows :—

Districts.	Quantity of Paddy Seeds required for an acre of Land.
	Lb.
Ganjam	92
Vizagapatam	71
Godavari	41
Kistna	108
Nellore	62
Cuddapah	58
Bellary	150
Kurnool	47
Chingleput	55
North Arcot	130
South Arcot	65
Tanjore	126
Trichinopoly	65
Madura	75
Tinnevely	138
Coimbatore	55
Nilgiris	—
Salem	67
South Canara	81
Malabar	145
Total	1,631
Average	86

The next point to be considered is the quantity of grain consumed in each district. Grain generally is consumed (1) for seed and (2) for food. The estimates of collectors and of the Director of Revenue Settle-

STATEMENT showing the quantity required for SEED in each DISTRICT of the MADRAS PRESIDENCY.

Districts.	Total Acreage under Paddy.	Seed required for an Acre in Paddy.	Quantity of Rice or Cleaned Grain for the whole Acreage, weight in Rice taken equal to 2/3 of the weight in Paddy.	Area under Dry Grains.	Quantity of Seed required for Dry Cultivation at 20 lbs. for an Acre.	Total of Cols. 4 and 6.	Remarks.
1.	2.	3.	4.	5.	6.	7.	8.
	Acres.	Lbs.	Tons.	Acres.	Tons.	Tons.	
Ganjam	7,07,000	92	20,000	3,16,000	3,000	23,000	The figures in col. 4 are 2/3 of col. 2 multiplied by col. 3 reduced to tons.
Vizagapatam	4,00,000	71	9,000	5,14,000	4,000	13,000	
Godavari	8,19,000	41	10,000	3,70,000	3,000	13,000	
Kistna	4,24,000	108	14,000	16,53,000	14,000	28,000	
Nellore	4,09,000	62	7,000	12,77,000	11,000	18,000	
Cuddapah	1,58,000	58	3,000	13,48,000	12,000	15,000	
Bellary	1,49,000	150	6,000	27,75,000	25,000	31,000	
Kurnool	67,000	47	1,000	16,94,000	15,000	16,000	
Chingleput	4,68,000	55	8,000	1,32,000	1,000	9,000	
N. Arcot	4,33,000	130	17,000	5,17,000	5,000	22,000	
S. Arcot	4,18,000	65	9,000	6,33,000	5,000	14,000	
Tanjore	10,96,000	126	38,000	2,97,000	3,000	41,000	
Trichinopoly	2,16,000	65	4,000	7,85,000	7,000	11,000	
Madura	3,30,000	75	7,000	13,95,000	12,000	19,000	
Tinnevely	2,46,000	138	10,000	11,33,000	10,000	20,000	
Coimbatore	91,000	55	2,000	21,02,000	19,000	21,000	
Nilgiris	—	—	—	35,000	—	—	
Salem	1,63,000	67	4,000	16,37,000	14,000	18,000	
S. Canara	4,86,000	81	12,000	48,000	—	12,000	
Malabar	5,85,000	145	25,000	8,000	—	25,000	
Total	75,75,000	1,631	2,06,000	186,69,000	1,63,000	3,69,000	
		Average 86					

STATEMENT showing the Calculations of Out-turn of Food Grains in the several Districts of Madras Presidency.

FOOD GRAINS.

DISTRICTS.	RICE.						CEREALS.			RAGI.						
	First Crop Irrigated.			Second Crop Irrigated.			Unirrigated.			Area in Acres.	Average Yield per Acre in Lbs.	Yield on the whole in Tons.				
	Area in Acres.	Average Yield per Acre in Lbs.	Yield on the whole in Tons.	Area in Acres.	Average Yield per Acre in Lbs.	Yield on the whole in Tons.	Area in Acres.	Average Yield per Acre in Lbs.	Yield on the whole in Tons.							
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	
1. Ganjam	-	5,43,000	896	2,17,000	44,000	448	9,000	1,20,000	890	47,000	3,000	666	1,000	1,99,000	798	71,000
2. Vizagapatam	-	3,80,000	1,081	1,83,000	-	540	-	20,000	890	8,000	21,000	666	6,000	1,03,000	770	35,000
3. Godavary	-	6,62,000	1,292	3,81,000	3,000	646	1,000	1,54,000	1,017	70,000	1,17,000	1,421	74,000	28,000	1,743	22,000
4. Kistna	-	2,67,000	1,344	1,60,000	1,000	672	-	1,56,000	640	45,000	6,49,000	992	2,87,000	25,000	770	9,000
5. Nellore	-	3,84,000	1,077	1,84,000	11,000	538	2,000	14,000	-	5,000	6,40,000	459	1,31,000	66,000	770	23,000
6. Cuddapah	-	1,27,000	1,465	83,000	27,000	732	9,000	4,000	-	1,000	4,67,000	551	1,15,000	1,30,000	657	38,000
7. Bellary	-	1,08,000	900	43,000	36,000	450	7,000	5,000	-	2,000	11,72,000	320	1,67,000	1,11,000	500	2,48,000
8. Kurnool	-	49,000	1,400	30,000	9,000	700	3,000	9,000	890	3,000	8,86,000	551	2,18,000	22,000	770	7,000
9. Chingleput	-	3,62,000	813	1,31,000	55,000	406	10,000	51,000	-	20,000	9,000	666	3,000	44,000	474	9,000
10. N. Arcot	-	3,02,000	1,667	2,25,000	1,22,000	833	45,000	9,000	-	3,000	35,000	600	9,000	1,47,000	800	52,000
11. S. Arcot	-	3,21,000	1,206	1,73,000	51,000	603	13,000	46,000	-	18,000	23,000	1,013	11,000	1,56,000	922	64,000
12. Tanjore	-	8,95,000	1,292	5,16,000	45,000	646	13,000	66,000	1,017	30,000	15,000	1,421	9,000	38,000	1,743	29,000
13. Trichinopoly	-	1,39,000	1,119	69,000	59,000	559	15,000	18,000	-	7,000	1,76,000	690	54,000	1,23,000	834	46,000
14. Madura	-	2,65,000	1,081	1,28,000	59,000	540	14,000	6,000	-	2,000	3,88,000	666	1,15,000	2,14,000	770	73,000
15. Tinnevely	-	2,16,000	1,189	1,15,000	30,000	594	8,000	-	890	-	1,49,000	666	44,000	83,000	770	28,000
16. Coimbatore	-	71,000	1,1	37,000	19,000	583	5,000	1,000	-	-	6,80,000	521	1,58,000	2,32,000	496	52,000
17. Nilgiris	-	-	-	-	-	-	-	-	-	-	-	-	-	4,000	357	-
18. Salem	-	1,17,000	1,222	64,000	26,000	611	7,000	20,000	-	8,000	1,00,000	939	42,000	5,00,000	945	2,11,000
19. S. Canara	-	2,00,000	1,008	90,000	1,76,000	504	40,000	1,10,000	472	23,000	-	-	-	4,000	770	1,000
20. Malabar	-	3,94,000	707	1,24,000	1,10,000	353	17,000	81,000	890	32,000	-	-	-	3,000	770	1,000
Total	-	58,02,000	-	29,53,000	8,83,000	-	2,18,000	8,90,000	-	324,000	55,30,000	-	14,44,000	22,32,000	-	10,19,000

STATEMENT showing the Calculations of Out-turn of Food Grains in the several Districts of Madras Presidency—continued.

FOOD GRAINS.

Districts.	VARAGU or ARICALE.			CUMDOO.			KORRALU or THENAY.			SAMAL.		PULSES.		MISCELLANEOUS CROPS.		Total Gross Out-turn of Food Grains in Tons.		
	Area in Acres.	Average Yield per Acre in Lbs.	Yield on the whole in Tons.	Area in Acres.	Average Yield per Acre in Lbs.	Yield on the whole in Tons.	Area in Acres.	Average Yield per Acre in Lbs.	Yield on the whole in Tons.	Area in Acres.	Yield on the whole per Acre.	Area in Acres.	Yield on the whole per Acre.	Area in Acres.	Yield on the whole at 600 Lbs. per Acre.			
0.																32.		
1. Ganjam	-	-	-	16,000	626	4,000	-	-	-	3,000	1,000	Acres.	87,900	17,000	Acres.	2,000	Tons.	3,69,000
2. Vizagapatnam	-	956	9,000	257,000	626	72,000	10,000	406	2,000	31,000	8,000	31,000	51,000	10,000	20,000	5,000	3,38,000	
3. Godavery	-	956	2,000	14,000	1,104	7,000	14,000	406	2,000	14,000	4,000	14,000	1,43,000	29,000	35,000	9,000	6,01,000	
4. Krishna	-	960	71,000	187,000	562	47,000	63,000	406	11,000	-	-	-	3,52,000	70,000	2,11,000	56,000	7,56,000	
5. Nellore	-	736	47,000	111,000	429	21,000	18,000	406	3,000	-	-	-	1,1	23,000	1,86,000	50,000	4,89,000	
6. Cuddapah	-	300	5,000	370,000	341	56,000	1,07,000	423	20,000	31,000	8,000	31,000	37,000	37,000	20,000	5,000	3,77,000	
7. Bellary	-	956	5,000	226,000	230	23,000	-	-	-	6,89,000	1,84,000	6,89,000	5,04,000	1,01,000	60,000	16,000	7,96,000	
8. Kurnool	-	956	61,000	97,000	626	27,000	3,30,000	381	58,000	-	-	-	1,55,000	31,000	52,000	14,000	4,52,000	
9. Chingleput	-	819	20,000	17,000	626	5,000	-	-	-	-	-	-	5,000	1,000	2,000	-	1,99,000	
10. N. Arcot	-	956	42,000	149,000	700	46,000	1,000	406	-	11,000	3,000	11,000	69,000	14,000	5,000	1,900	4,40,000	
11. S. Arcot	-	1,485	1,30,000	224,000	921	92,000	-	-	-	6,000	1,000	6,000	24,000	5,000	3,000	1,000	5,08,000	
12. Tanjore	-	956	62,000	57,000	1,104	28,000	-	-	-	-	-	-	31,000	6,000	11,000	3,000	6,96,000	
13. Trichinopoly	-	1,208	98,000	185,000	638	53,000	1,000	406	-	35,000	9,000	35,000	84,000	17,000	-	-	3,68,000	
14. Madura	-	956	75,000	228,000	926	64,000	18,000	406	3,000	2,06,000	55,000	2,06,000	1,31,000	26,000	34,000	9,000	5,64,000	
15. Tinnevely	-	956	31,000	465,000	626	1,30,000	2,000	406	-	2,24,000	60,000	2,24,000	1,19,000	24,000	17,000	4,000	4,44,000	
16. Coimbatore	-	956	3,000	792,000	479	1,69,000	41,000	406	7,000	1,04,000	28,000	1,04,000	2,35,000	47,000	9,000	2,000	5,08,000	
17. Nilgiris	-	-	-	-	-	-	13,000	604	3,000	6,000	1,000	6,000	-	-	12,000	3,000	7,000	
18. Salem	-	956	52,000	464,000	802	1,66,000	20,000	406	4,000	90,000	24,000	90,000	3,24,000	65,000	16,000	4,000	6,47,000	
19. S. Canara	-	-	-	-	-	-	-	-	-	-	-	-	43,000	9,000	1,000	-	1,63,000	
20. Malabar	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5,000	1,000	1,75,000	
Total	-	-	7,13,000	38,59,000	-	10,10,000	6,47,000	-	1,13,000	14,50,000	3,86,000	14,50,000	26,56,000	5,32,000	7,07,000	1,85,000	88,97,000	

CHAP. I. QN. 3. For dry grains the quantity required varies from 6 lbs. to 21 lbs. per acre. The Board consider that the quantity may be taken at 20 lbs. per acre for all grains, and this will leave an ample margin for wastage, &c. The quantity required in each district for seed will be as follows:—

	Tons.
Ganjam - - - -	23,000
Vizagapatam - - -	13,000
Godavari - - - -	13,000
Kistna - - - -	28,000
Nellore - - - -	18,000
Cuddapah - - - -	15,000
Bellary - - - -	31,000
Kurnool - - - -	16,000
Chingleput - - - -	9,000
North Arcot - - -	22,000
South Arcot - - -	14,000
Tanjore - - - -	41,000
Trichinopoly - - -	11,000
Madura - - - -	19,000
Tinnevely - - - -	20,000
Coimbatore - - - -	21,000
Nilgiris - - - -	—
Salem - - - -	18,000
South Canara - - -	12,000
Malabar - - - -	25,000
Total - - - -	369,000

To ascertain the food consumption the estimated average quantity consumed by an individual per diem has been multiplied by the total population. The collectors of all districts were asked to report the average quantity of grain consumed by adults above 12 years of age and juveniles below 12 years, and the estimates furnished by them are shown in the following table:—

STATEMENT showing the quantity of Food consumed by each Individual per Diem.

Districts.	Male Adult.	Boy.	Female Adult.	Girl.
Ganjam - - - -	Lb. 2 to 2½	Lb. 1 to 1½	Lb. 2 to 2½	Lb. 1 to 1½
Vizagapatam - - -	2 to 2½	1 to 1½	2 to 2½	1 to 1½
Godavari - - - -	2 to 2½	1 to 1½	2 to 2½	1 to 1½
Kistna - - - -	2 to 2½	1 to 1½	2 to 2½	1 to 1½
Nellore - - - -	2 to 2½	1 to 1½	2 to 2½	1 to 1½
Cuddapah - - - -	2 to 2½	1 to 1½	2 to 2½	1 to 1½
Bellary - - - -	2 to 2½	1 to 1½	2 to 2½	1 to 1½
Kurnool - - - -	2 to 2½	1 to 1½	2 to 2½	1 to 1½
Madras - - - -	2 to 2½	1 to 1½	2 to 2½	1 to 1½
Chingleput - - - -	2 to 2½	1 to 1½	2 to 2½	1 to 1½
North Arcot - - -	2 to 2½	1 to 1½	2 to 2½	1 to 1½
South Arcot - - -	Rice 1½ to 2½ Cumbu 2½ to 3½ Ragi 1 to 1½ Cholum 3½ to 4½	Rice 1½ to 2½ Cumbu 2½ to 3½ Ragi 1 to 1½ Cholum 3½ to 4½	Rice 1½ to 2½ Cumbu 2½ to 3½ Ragi 1 to 1½ Cholum 3½ to 4½	Rice 1½ to 2½ Cumbu 2½ to 3½ Ragi 1 to 1½ Cholum 3½ to 4½
Tanjore - - - -	2 to 2½	1 to 1½	2 to 2½	1 to 1½
Trichinopoly - - -	2 to 2½	1 to 1½	2 to 2½	1 to 1½
Madura - - - -	2 to 2½	1 to 1½	2 to 2½	1 to 1½
Tinnevely - - - -	2 to 2½	1 to 1½	2 to 2½	1 to 1½
Coimbatore - - - -	2 to 2½	1 to 1½	2 to 2½	1 to 1½
Nilgiris - - - -	1½ to 2	1 to 1½	1½ to 2	1 to 1½
Salem - - - -	2 to 2½	1 to 1½	2 to 2½	1 to 1½
South Canara - - -	2 to 2½	1 to 1½	2 to 2½	1 to 1½
Malabar - - - -	1 to 1½	1 to 1½	1 to 1½	1 to 1½

The Sanitary Commissioner, who was at the same time asked for information on the subject, states: "In regard to calculations regarding average grain consumption, it may be assumed that two-thirds of the people require a full average ration, and of the remaining one-third, half will require a half ration and the other half a quarter.

"These are rough calculations but founded on the relative ages and the number above and below 10 years of age, and of the latter taking a separate account of those from 0 to 5.

"Assuming, therefore, that 24 ounces of cereal grain represents the average consumption of an adult, the following quantities will be required for the daily sustenance of a population of 100 persons—

	Lb. of Grain.
66 adults (above 10 years) - - -	99
17 children (from 5 to 10 years) - - -	12·75
17 infants (from 0 to 5 years) - - -	6·37
Total - - - -	118·2

"It would be safe to allow a margin on this calculation, and to reckon that each 100 of the population require from 120 to 125 lbs. of grain per diem, say 1¼ lbs. per head all round. It is by no means intended that the people restrict themselves to the consumption as above calculated, but jail experience shows that 24 ounces of millet with meat, dhal, vegetables, salt, and condiments is sufficient to prevent excessive bodily waste under the moderate exertion involved in jail labour.

"The domestic consumption of grain is no doubt influenced by abundance or scarcity."

It will be observed that the consumption of grain by an adult is estimated by all collectors, except that of Kurnool, at either 1½ lbs. or more than that quantity. Generally, food consumption would seem to be much greater in the northern than in the southern districts as might perhaps be expected, from the difference in physique. Mr. Crole, the collector of Kurnool, however, states that an allowance of 1 lb. of grain for an adult and ½ lb. for a juvenile is ample. The Board will not attempt to reconcile the different statements as the question will doubtless be fully considered by the Famine Commission in all its bearings in connection with the rate of wages to be allowed for famine labour. For the purpose of the calculation of the total consumption of grain in each district the Board have adopted Dr. Cornish's estimate, supported as it is by the majority of the collectors. Calculated at the rate of 1¼ lbs. per individual, the total consumption of corn in each district will be as follows:—

	Tons.
Ganjam - - - -	283,000
Vizagapatam - - -	376,000
Godavari - - - -	324,000
Kistna - - - -	296,000
Nellore - - - -	280,000
Cuddapah - - - -	275,000
Bellary - - - -	340,000
Kurnool - - - -	195,000
Madras - - - -	81,000
Chingleput - - - -	191,000
North Arcot - - -	410,000
South Arcot - - -	357,000
Tanjore - - - -	402,000
Trichinopoly - - -	244,000
Madura - - - -	462,000
Tinnevely - - - -	345,000
Coimbatore - - - -	359,000
Nilgiris - - - -	10,000
Salem - - - -	401,000
South Canara - - -	187,000
Malabar - - - -	460,000
Total - - - -	6,278,000

Deducting from the total out-turn the quantity consumed as food, and that expended as seed, the deficiency which must be made up by importation or the excess available for export is arrived at. The following table gives the information. A column is added to show the actual exports and imports by sea for a typical year, viz., 1875-76. No information is available in regard to the exports by land:—

Districts.	Quantity of Food Grain available for Export or Deficiency to be made up by Import.	Imports by Sea in 1875-76.	Exports by Sea in 1875-76.
1. Ganjam - - - -	Tons. 63,000	Tons. 18,000	Tons. 18,000
2. Vizagapatam - - -	51,000	5,000	1,000
3. Godavari - - - -	294,000	1,000	39,000
4. Kistna - - - -	432,000	1,000	20,000
5. Nellore - - - -	241,000	2,000	3,000
6. Cuddapah - - - -	87,000	—	—
7. Bellary - - - -	425,000	—	—
8. Kurnool - - - -	191,000	—	—
9. Madras - - - -	81,000	43,000	7,000
10. Chingleput - - - -	1,000	—	—
11. North Arcot - - -	8,000	—	—
12. South Arcot - - -	137,000	2,000	16,000
13. Tanjore - - - -	243,000	6,000	83,000
14. Trichinopoly - - -	113,000	—	—
15. Madura - - - -	83,000	6,000	1,000
16. Tinnevely - - - -	79,000	9,000	1,000
17. Coimbatore - - - -	123,000	—	—
18. Nilgiris - - - -	3,000	—	—
19. Salem - - - -	223,000	—	—
20. South Canara - - -	36,000	3,000	29,000
21. Malabar - - - -	310,000	67,000	9,000
Total - - - -	2,250,000	145,000	227,000

According to the above calculation, the average surplus quantity of grain is about 36 per cent. of the quantity consumed as food and as seed. Mr. Benson makes out that the grain produced is barely sufficient to feed the population. This can hardly be the case, as recent famine experience has shown that, notwithstanding three successive bad seasons, there were considerable stocks in the country, on which the population, to a great extent subsisted, the quantity of imported grain bearing but a small proportion to the quantity required by the population for food.

The Board must, however, here mention that they do not present the above estimates with any very great confidence, resting as they do to a great extent upon hypothetical data, and seeing that a slight error in any one particular may vitiate the whole result and show an exporting district as unable to support its population, and *vice versa*. Taking, for instance, the great rice-growing district of Tanjore, if the collectors

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Alwar.—*Capt. Law.*—With reference to statistics required showing the average area in each district under cultivation yearly, Major Powlett, in his *Gazetteer of Alwar*, gives, at page 188, the following statement as to the amount of land cultivated; but it refers to only fiscal villages, which comprise about five-sixths of the state:—

TOTAL CULTIVATED.			Culturable.	Unculturable.	Revenue Free in Fiscal Villages.	Total.
Irrigated.	Unirrigated.	Total.				
316,279	1,026,303	1,342,588	252,612	740,344	82,404	2,417,978

N.B.—These figures are higher (see answer 4) and should be converted into acres at 5 bighas = 2 acres.

The same work gives some more information demanded in this question; and below is given an extract from page 87:—

"The following figures show approximately the relative proportions of the areas covered by the crops chiefly grown:—

Bajra - - - -	331 of the whole cultivated area.
Barley - - - -	119
Joar - - - -	089
Gram - - - -	071
Cotton - - - -	069
Indian-corn - - -	023
Wheat - - - -	021
Sarsu - - - -	007
Miscellaneous - - -	276 of the whole cultivated area, chiefly pulses.

"In this computation the double-cropped land has been counted twice, in order that the crops for one whole year might be taken into account.

"The land under sugar-cane was about 2,000 acres,

estimate of average out-turn be adopted and the assumed rate of consumption per individual per diem be increased by ever so small a quantity, say 4 ozs., the surplus grain of the district will disappear, and the amount produced will be barely sufficient to maintain the population. The consumption of grain in the country doubtless rises and falls with abundant harvests or the reverse.

Method of collecting these statistics and the amount of reliance to be placed upon them.—For ryotwari and inam lands information regarding cultivation is collected by the village accountants, and it may be considered fairly reliable. From zemindaris the greatest difficulty is experienced in getting any statistical information, as the office of village curnam or accountant is not properly maintained, and collectors are powerless to punish the recalcitrant curnams or to see that the office is held by qualified men, jurisdiction in regard to these matters being vested in the civil courts. The Board have recommended legislation with a view to placing zemindari curnams under the authority of collectors, and the proposal is under the consideration of Government. It will be simply impossible to get any agricultural statistics at all worth having unless this is done.

As to out-turn of produce in the cultivated area, no reliable information can be obtained unless a large and expensive establishment is entertained to check carefully and intelligently any estimates that may be given by the village accountants. It is an indisputable fact that the present taluk establishments are overworked and unable to cope with the existing work, and it would be extremely undesirable to impose upon them any additional duties. The Board have submitted proposals for strengthening the taluk establishments with a view to rendering them more efficient; but Government, while admitting the necessity of doing something, have been obliged to postpone the consideration of the question for financial reasons. This question of collecting statistical information was dealt with in Board's Proceedings, dated 15th March 1876, No. 739.

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that under tobacco about 1,200, and the opium only about 450. But, as the survey was made preparatory to assessment, the people had no doubt devoted a smaller area than usual to these valuable crops.

"The average yield of bajra land (unirrigated) varies from 2½ to 12½ maunds the acre, according to soil. Usually, several pulses are grown with the bajra, and make about a third of the above estimate, though sometimes, owing to the character of the season, the yield of pulse greatly exceeds that of bajra grown with it. Irrigated barley has been estimated at from 10 to 35 maunds the bigha; gram (unirrigated) at 10 to 30 maunds; cotton (irrigated) at 3½ to 12½ maunds (including seed)."

From a rough calculation as to the produce of the land and the requirements of the population, sowing operations included, it would appear that the consumption of food grains in this state would be at 20·02 per head per diem about 46,36,179 maunds per annum; and that the yield being some 50,75,604, there would remain about 4,39,425 for exportation. The books of the Customs Department give the following results:—

Year.	Export.	Import.	Excess of Export over Import.
1871 - - - -	Mds. 2,27,258	Mds. 67,907	Mds. 1,59,291
1874 - - - -	9,70,302	76,423	8,93,879
1875 - - - -	3,69,068	1,55,132	2,13,936
1876 - - - -	3,85,284	1,23,073	2,62,311

The average excess of food grain exported over imported during these four years was therefore 3,82,354 maunds.

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Dholpur.—*Lieut.-Col. Denmchey.*—The average area under cultivation in the entire state of Dholpur is 262,569 acres. Of this 231,327 acres are under *food crops*, of which 29,300 acres give two crops a year.

The average amount produced per acre is:—

Of wheat	-	-	25 maunds.
Of barley	-	-	30 "
Of gram	-	-	12 "
Of bajra	-	-	10 "
Of joar	-	-	10 "
Of urd	-	-	7 "
Of mote	-	-	10 "
Of arhar	-	-	12½ "

The total consumption of the state is per annum about 1,727,500 maunds, and a surplus of about 1,501,866 maunds, chiefly of wheat, barley, and gram, remains for export.

The more valuable crops are generally limited to the

Kotah.—*Major Powlett.*—I have no statistics of cultivation of any state but Kotah. But I believe that Boondee and the City pargana of Tonk have little good culturable waste. Other parganas of Tonk and Kotah have, owing to mismanagement, much waste now which was once cultivated.

In Colonel Tod's time Kotah was governed by the ablest minister in Rajputana; and Colonel Tod says there was then little culturable waste. Now there are at least 150,000 acres; but it is being fast broken up. Taking three villages situated in different parganas, I find that of 10,400 cultivated bighas, 9,012 were under food crops, or 86·5 per cent.

The average yield per acre of the chief food crops, namely, wheat (unirrigated barley is little grown), gram, and joar, are said to average on land well but recently broken up from 4 to 8 maunds, 8 to 15 maunds, and 5 to 9 maunds respectively. But 20 years of incessant cultivation will reduce this capacity of production 40 per cent. In good well-land the yield is 35 maunds in the year. The irri-

fields close to the village site, to which also generally the means of irrigation are confined, and on which the manure procurable in the village can more readily be made available.

The superior kinds of crops, such as wheat, joar, &c., &c., and certain of the good miscellaneous crops, occupy only 33 per cent. of the cultivation, whereas the inferior grains, bajra, mote, bejhra, gram, and barley (both of which last in ordinary years are decidedly inferior), cover 67 per cent.

The proportion of kharif to rabi crops are 66½ per cent. of the former to 33½ per cent. of the latter on the total cultivated area.

These statistics are the result of repeated and careful inquiries made by me previous to the late scarcity; they have been further controlled by the information collected during the land settlement operations lately going on in the state.

gated food crop is generally barley or makka, followed by wheat. The amount of grain exported from Kotah averaged during the last two years 13,700 tons. This was chiefly wheat and gram.

Grain is never, I believe, imported into Haraoti, which is a great grain-supplying tract. Colonel Tod records that "in Sambat 1860 (A.D. 1804), during the Mahratta War, when Holakr was in the Bhartpur State, and predatory armies were moving in every direction, and when famine and war conjoined to desolate the country, Kotah fed the whole population of Rajwara, and supplied all these roving hordes. In that season grain being Rs. 55 the 'mauni' (12 maunds of 75 lbs. each), he (the minister mentioned below) sold to the enormous amount of one crore of rupees, or a million sterling."

This grain was stored in pits situated in high and dry places. At present the British cantonment of Neemuch is dependent on Kotah for much of the grain that it consumes; and Boondee exports to Deolee, Nusseerabad, and Ajmere.

Bhartpur.—*Mr. Spencer.*—The area under cultivation amounts to 1,692,892 bighas, but there are no data to distinguish food crops from others. An estimate will, however, be hazarded; if two lakhs of bighas be assigned to cotton, indigo, sugar-cane, carrots, &c., &c., the remaining area, 1,492,892, would be under cultivation of food crops. Six maunds is perhaps the average

out-turn of each bigha; at this rate the total out-turn of the state would approximately be 8,957,352 maunds, and taking 6 maunds and 30 seers as the amount of consumption by each individual, the total consumption of the state, which has a population of 7 lakhs, would be 4,725,000 maunds. It is impossible to give even an estimate of the corn consumed by the cattle.

CENTRAL INDIA.

	Total Area cultivated.	Under Food Grains.	Average Produce per Acre.	Total Produce.	Consumption.	Available for Export.
	Acres.	Acres.	Maunds.	Maunds.	Maunds.	Maunds.
Bhopal	1,570,000	1,413,000 or 9-10ths.	3	4,239,000	1,855,000 or 7-16ths.	2,384,000 or 9-16ths. Deficit
Rutlam	284,500	256,000 or 9-10ths.	3	768,000	1,042,000	274,000, supplemented from hilly tracts.
Manpur Pergunnah	2,836	2,415	6	18,824 in 1877.	19,787 at 1 lb. per head.	—

N.B.—In Baghelkhand—Wheat per acre 6 to 7 maunds.

Kodoo " 7 " 8 "

Rice " 6 " 7 "

HYDERABAD.

The following statement taken from the Administration Report prepared in the Revenue Minister's office, will show the area under cultivation in each district in the year 1284 Fasli, (A.D. 1874) distinguishing food crops from others:—

District.	Land under Food Crops.	Land under other Crops.	Total.	Percentage of Area under Food Crops to Total Area.	Percentage of Area under other Crops to Total Area.
1.	2.	3.	4.	5.	6.
Mayduk	127,688	9,828	137,516	92·9	7·1
Indur	146,446	54,618	201,064	73·06	26·94
Yelgundul	371,084	62,372	433,456	85·6	14·4
Sirpur-Randur	128,180	53,821	182,001	70·4	29·6
Khumnum	379,328	51,490	430,818	88·04	11·96
Nalgunda	373,774	100,565	474,339	78·8	21·2
Nagur-Kurnul	268,634	55,616	324,250	82·9	17·1
Total Telingana	1,793,134	387,740	2,180,874	82·2	17·8
Aurangabad	1,305,705	116,292	1,422,087	91·8	8·2
Bead	1,242,351	255,141	1,497,492	82·9	17·1
Purbhani	815,161	191,422	1,006,583	80·9	19·1
Beeder	306,800	76,109	382,909	80·1	19·9
Nandair	514,275	299,896	814,171	61·5	38·5
Naldurg	389,346	114,884	504,230	77·2	22·8
Gulbarga	332,080	63,806	395,886	83·9	16·1
Shorapur	432,603	130,889	563,492	76·8	23·2
Raichur	590,283	206,386	796,669	74·1	25·9
Lingsugur	769,664	167,220	936,884	80·9	19·1
Total Mahrattwari	6,669,258	1,612,045	8,281,303	80·6	19·4
Grand Total	8,464,392	1,999,785	10,464,177	80·9	19·1

Average amount of food grains produced per acre.—To this question no satisfactory categorical answer can be given. There are no means of defining precisely the different qualities of land in various taluks, the amount of out-turn in each for any series of years, the variations of the seasons, rainfall, its distribution, &c. From 20 years experience acquired during my employment in the Revenue Department under the British Government, I can safely state that it is very difficult to form any very exact estimate of out-turn.

For the last three years I, as well as most of the talukdars, have been very carefully conducting inquiries in His Highness the Nizam's dominions; but still it cannot be said that the result has been such as may be fully relied on.

The explanation of this want of success will be found in the fact that there are only three methods of

acquiring information on the subject, and that each of them is wholly or partially defective. The first and the most generally adopted method is to get the required information from the cultivators themselves; but they, when questioned on the subject, avoid giving any reliable information on the supposition that any increase, real or supposed, in the out-turn would lead to a corresponding enhancement in the revenue dues. Any conclusion drawn from their statements would certainly therefore be fallacious and necessarily incorrect, nor would they even furnish a basis for any estimate of the minimum out-turn. The second method is to compare the statement of the cultivators with the saukars books, for in most cases the cultivators make over to the saukars the produce of their fields. This method though much better than the former, is subject to two great errors. In the first place the amount of produce consumed by the cultivator himself or given to the labourers employed, or the portion reserved for seed, is not entered in the saukars books, and in the second place, the saukar himself is unreasonably afraid to give the correct account, and generally he avoids doing so. The third and the most accurate method is to weigh the produce of the field as soon as it is reaped. But in this, as in the preceding cases, so many contingencies have to be allowed for, such as the quality of the land, the nature of the season, the quantity of manure applied, and the different methods of agriculture employed, that though the produce of the fields subjected to this mode of inquiry may be accurately determined for one season, an estimate deduced therefrom for a whole taluka, district, or province will not be correct.

I have made many experiments by this third method but always discovered vast discrepancies in the results. I have seen fields of the best description which, owing to idleness on the part of the cultivators, have produced a less quantity of grain than that of the poorest kind of land which had been well manured, or which owing to temporary causes produced a splendid crop one year and a miserable one the next. Not to speak of a whole province, the determination of the amount of the produce per acre of a taluka, therefore, appears to me to be a matter in which disappointment is generally the result.

However, the results of the special inquiries, conducted by me and by the talukdars on this subject, are embodied in the following tables:—

RESULT OF INQUIRIES conducted by TALUKDARS.

District.	Taluka.	Inquiring Officer's Name.	Kind of Crops.	Class of Soil.	Average Produce per Acre in Maunds of 40 Seers (Seer equal to 80 Tolas).
TELANGANA.					
Mayduk	Kallabgur	Mr. Hassan bin Abdulla, 1st Talukdar.	Yellow joar	1st class	8
			"	2nd "	5
			White joar	1st "	11
			"	2nd "	8
			White "	1st "	8
			"	2nd "	6
			Paddy abi	1st "	65
			"	2nd "	48
			"	3rd "	32
			Paddy tabi	1st "	99
			"	2nd "	65
			"	3rd "	48
Indur	Baswada	Moulvi Nazir Ahmed, Saddar Talukdar.	Savan	1st "	9
			"	2nd "	7
			Kodru	1st "	13
			"	2nd "	11
			Paddy abi	1st "	54
			"	2nd "	43
			"	3rd "	32
			White joar	1st "	13
			"	2nd "	11
			Paddy tabi	1st "	75
			"	2nd "	64
			"	3rd "	45

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HYDERABAD.
Moulvi Mahdi
Ali.

District.	Taluka.	Inquiring Officer's Name.	Kind of Crops.	Class of Soil.	Average Produce per Acre in Maunds of 40 Seers (Seer equal to 80 Tolas).
Indur	Yellareddy Pet	Moulvi Nazir Ahmud	Kodru	1st class	17
			"	2nd "	14
			"	3rd "	10
			White joar	1st "	9
			"	2nd "	7
			"	3rd "	5
			Paddy abi	1st "	44
			"	2nd "	35
			"	3rd "	26
			Paddy tabi	1st "	70
Kummum	Wurrungul	Mr. Swami Rao, Sudder Talukdar.	Yellow joar	1st "	6
			White "	"	13
			Gram	"	4
			Tur	"	4
			Paddy abi	"	25
			" tabi	"	21
			Maize	"	11
			Yellow joar	"	6
			Bajra	"	6
			White joar	"	5
Nagur-Kurnul	Nagur-Kurnul	Mr. Narsingha Rao, 2nd Talukdar.	Paddy abi	"	27
			" tabi	"	34
			Paddy	"	21
			Yellow joar	"	11
			Tur	"	9
Purbhani	Purbhani	Mr. Shaik, Bahaudün, 1st Talukdar.	White joar	"	18
			Wheat	"	11
			Gram	"	11
			White joar	"	4
			Wheat	"	4
Gulbarga	Saydam	Mr. Syed Asadulla, 1st Talukdar.	Gram	"	4
			White joar	"	4
			Wheat	"	4
Atraf Balda	Atraf Balda	Mr. Shaik Gulamali, Madadgar Talukdar.	Yellow joar and bajra	"	4
			White joar	"	5
			Paddy abi	"	41
			" tabi	"	54

The result of my own inquiries, based on the third method and conducted in 11 villages in the Paitan Taluka in 1285 Fasli (1875-76) is given below :—

Village.	No. of Fields Experimented Upon.	Average Produce per Acre in Maunds.		
		Primary Crop.	Subordinate Crop.	Total.
Tandulwadi	5	M. S.	M. S.	M. S.
Sonwadi (Khurd)	2	7 14	2 22	9 36
Mehomadpur	3	13 28	2 22	16 10
Telwadi	3	7 22	1 13	9 0
Sonwadi (Buzarg)	3	6 26	—	6 26
Kausan	2	7 33	2 0	9 33
Lingatpuri	4	9 3	—	9 3
Ghori	1	6 39	—	6 39
Ismailpur	2	4 1	2 0	6 1
Changatpuri	2	7 15	2 0	9 15
Saigaon	1	7 15	1 27	6 28
	1	8 29	2 0	10 29
Total	—	81 11	16 9	100 20
Average	—	7 28	1 19	9 5

From this it will appear that 28 fields were reaped and the produce of each was weighed. The highest amount of produce per bigha is shown in it as 13 maunds 24 seers, of which the principal crop—joar—weighed 11 maunds 32 seers, and the subordinate crop, 1 maund 32 seers, which give per acre 18 maunds 11 seers (=1,498 lbs. *avoirdupois*). The lowest amount of produce per bigha is 4 maunds 20 seers, of which joar was 3 maunds, while the subordinate crop 1 maund 20 seers, or 6 maunds 2 seers (=494 lbs.) per acre.

Inquiries were conducted by district officers in 1287 Fasli (1877-78) in eight districts, and the average results were as follows :—

Crop.	No. of Fields Experimented on.	Produce per Acre.	
Joar	12	Maunds.	Seers.
Wheat	1	9	36
Bajra	1	8	20
Paddy	3	4	28
		46	21

The Talukdar of Aurungabad has submitted the result of his inquiry for 1288 Fasli (1878-79), which is as follows :—

In nine fields of joar the average produce was 9 maunds 3 seers.

The following table will show the rough average for the two natural divisions of the country, Telingana and Maratwari :—

Chief Food Grain.	Produce per Acre in Maunds.	
	Telingana.	Maratwari.
Yellow joar	6	8
Bajra	5	7
Kodru	10	8
Sanvan	8	13
Paddy (abi)	30	15
White joar	5	8
Wheat	3	4
Paddy (tabi)	35	—

A rough estimate of total cultivated area, produce, consumption, and the surplus that remained for export in the year 1284, A.D. 1874, Fasli, is given below :—

District.	Cultivated Area of Food Produce.	Estimated Amount of Food Produce.	Population.		Amount in Maunds of Food Consumed at the Rate of 12 Chitaks per Head per Diem, or 19 Maunds per 1,000 Souls, or 6,939 Maunds or 247 $\frac{3}{4}$ Tons per Year.	Balance of Store for Export.
			Of District.	Per Sq. Mile Cultivated Area.		
TELINGANA.						
Maydak	- Acres 1,27,688	43,60,654 Mds.	1,56,079	726	10,82,408 Mds.	32,78,246 Mds.
	Sq. miles 199	1,55,737 Tons	—	—	38,657 Tons	1,17,080 Tons
Indur	- Acres 1,46,446	45,82,464 Mds.	2,43,298	777	16,87,272 Mds.	28,95,192 Mds.
	Sq. miles 229	1,63,659 Tons	—	—	60,260 Tons	1,03,399 Tons
Yelgandal	- Acres 3,71,084	76,22,221 Mds.	4,60,610	680	31,94,330 Mds.	44,27,891 Mds.
	Sq. miles 580	2,72,222 Tons	—	—	1,14,083 Tons	1,58,139 Tons
Sirpur Tandur	- Acres 1,28,180	11,34,293 Mds.	1,47,973	521	10,26,193 Mds.	1,08,100 Mds.
	Sq. miles 200	40,510 Tons	—	—	36,650 Tons	3,860 Tons
Khumum	- Acres 3,79,328	64,61,368 Mds.	2,70,250	402	18,74,184 Mds.	45,87,184 Mds.
	Sq. miles 593	2,30,762 Tons	—	—	66,935 Tons	1,63,827 Tons
Nulgunda	- Acres 3,73,774	41,54,184 Mds.	2,26,619	306	15,71,603 Mds.	25,82,581 Mds.
	Sq. miles 584	1,48,363 Tons	—	—	56,129 Tons	92,234 Tons
Nagur-Kurnal	- Acres 2,68,634	41,06,356 Mds.	1,57,184	310	10,90,071 Mds.	30,16,285 Mds.
	Sq. miles 420	1,46,656 Tons	—	—	38,931 Tons	1,07,725 Tons
Total Telingana	- Acres 17,95,134	3,24,21,540 Mds.	16,62,013	487	1,15,26,061 Mds.	2,08,95,479 Mds.
	Sq. miles 2,805	11,57,909 Tons.	—	—	4,11,645 Tons	7,46,264 Tons

MAHRATWARI.						
Aurangabad	Acre 13,05,795 Sq. miles 2,040	88,35,904 Mds. 3,15,568 Tons	3,31,702	149	22,00,353 Mds. 78,584 Tons	66,35,551 Mds. 2,36,984 Tons
Beed	Acre 12,42,351 Sq. miles 1,941	1,06,65,705 Mds. 3,80,918 Tons	2,58,338	110	17,91,574 Mds. 63,985 Tons	88,74,131 Mds. 3,16,933 Tons
Purbhani	Acre 8,15,161 Sq. miles 1,274	58,47,874 Mds. 2,08,853 Tons	2,76,620	176	19,18,360 Mds. 68,513 Tons	39,29,514 Mds. 1,40,340 Tons
Bidar	Acre 306,800 Sq. miles 480	2,318,961 Mds. 82,820 Tons	212,001	355	1,470,227 Mds. 52,508 Tons	848,734 Mds. 30,312 Tons
Nandair	Acre 544,275 Sq. miles 851	3,660,480 Mds. 130,731 Tons	347,612	264	2,410,689 Mds. 86,096 Tons	1,249,791 Mds. 44,635 Tons
Naldurg	Acre 389,346 Sq. miles 608	1,636,682 Mds. 58,452 Tons	267,180	339	1,852,893 Mds. 66,175 Tons	—216,211 Mds. —7,723 Tons
Gulbarga	Acre 332,980 Sq. miles 529	2,256,317 Mds. 80,583 Tons	198,043	328	1,373,428 Mds. 49,051 Tons	882,889 Mds. 31,532 Tons
Shorapur	Acre 432,603 Sq. miles 676	3,518,058 Mds. 125,645 Tons	272,345	309	1,888,712 Mds. 67,454 Tons	1,629,346 Mds. 58,191 Tons
Raichur	Acre 590,283 Sq. miles 922	3,031,607 Mds. 108,272 Tons	295,848	238	2,051,706 Mds. 73,275 Tons	979,901 Mds. 34,997 Tons
Lingasugur	Acre 709,664 Sq. miles 1,109	3,012,363 Mds. 107,584 Tons	251,911	184	1,747,003 Mds. 62,393 Tons	1,265,360 Mds. 45,191 Tons
Total Marhatwari	Acre 6,669,258 Sq. miles 10,421	44,783,951 Mds. 1,599,426 Tons	2,711,600	209	18,704,945 Mds. 668,034 Tons	26,079,006 Mds. 931,392 Tons
Grand Total	Acre 8,464,392 Sq. miles 13,226	77,205,491 Mds. 2,757,335 Tons	4,373,613	267	30,231,006 Mds. 1,079,679 Tons	46,974,485 Mds. 1,677,656 Tons

From the above statement it will appear that in a good year about 1,677,000 tons of grain are left for export or store, taking both provinces together.

From experience it may be confidently stated that the surplus remaining for export and store never falls below the above estimate in a favourable year. It will also be seen that the produce in a favourable year is sufficient to cover the consumption of food grains by His Highness the Nizam's subjects for two years.

From the experience acquired during the famine of 1286 and 1287 Fasli (1876-77-78), it would appear that although the produce continued to decrease below the average for three successive years, no great complaint of scarcity of grain was ever made throughout the famine.

There are, however, two points to be taken into consideration in connection with this account. The estimated out-turn is for a good year, and no deductions have been made for seed and wastage, which will be done now. Then again, the number of population given is taken from the patwaris records, which is much below the actual number, as has been stated elsewhere. Taking an average of the past eight years, we may estimate the annual out-turn of food grains at 1,948,000 tons, in place of 2,757,000 tons, as has been estimated for the year 1284. In place of a population of 43,73,600 we have now estimated it at 56,85,700, increasing it by 30 per cent. The consumption is set down at 480 lbs., or 6 maunds per head per annum.

In estimating this some allowance has been made for infants, &c.

The consumption may therefore be set down at 1,218,000 tons, the wastage at 57,000 tons, aggregating in all 1,372,000 tons. The balance available for export or store is about 576,000 tons. Further details regarding this subject will be found in answer to question IX.

The figures supplied by the Customs Department show that the grain exported from His Highness the Nizam's dominions in 1286 (1876-77), which was a year of drought and scarcity, amounted to 3,510,880 maunds (125,389 tons), and consisted chiefly of joar, the principal produce of Maratwari. It must also be remembered that of the grain imported into His Highness the Nizam's territories (which in 1286 Fasli amounted to 2,914,753 maunds=104,098 tons, including 408,000 maunds=14,571 tons grain exported from the mofussil districts into the city of Hyderabad: the net amount imported from the British territories being 89,527 tons), a large proportion goes to supply the requirements of the large population of the city of Hyderabad and of the cantonment of Secunderabad.

In 1286 Fasli (1876-77) the articles imported into His Highness' dominions were chiefly wheat, gram, and rice—food grains scantily produced in that year :—

Wheat.	Gram.	Rice.	Total.
Maunds - 427,806	353,330	1,301,952	2,083,088

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PUNJAB.

Major Wace.

CHAPTER I.—QUESTION 4.

What area of your province and of its several districts is protected from drought in an average year by irrigation from wells, tanks or jhils, canals, or channels from rivers? To how much of this area is the protection complete and permanent, and how much is dependent on the local rain? How much of the area so protected is devoted to food crops, and what is the total amount of produce from that area? What is the effect of irrigation of crops (other than food crops) in adding to the powers of the population to resist famine? Supposing canals, tanks, wells, and jhils to be utilized to the utmost extent and kept in the highest possible order, what extent of the country would be protected from drought in a year when there was a failure of the rain?

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With regard to the first part of this question, statistics have been received from district officers, and are compiled in a statement appended. It will be seen from it that (speaking in round numbers) of an annual average crop area amounting in 21 millions we have—

	Millions of Acres.		
	Irrigated.	Unirrigated.	Total.
Under food grains, pulses included.	4½	14	18½
Under other crops - -	1	1½	2½
Total - - - -	5½	15½	21

Of the 14 million acres of unirrigated food grains, about 1½ millions are grown on sailab land; that is to say, on the moist alluvial lands situate in the beds and on the banks of the Punjab rivers, where, owing to the excessive dews and percolation from the rivers, very little rain is needed by the crops.

In a country such as the Punjab, where the rain-fall varies from an abundant and almost certain supply in the submontane districts to a quantity in the southern tracts so small that cultivation is possible only where aided by irrigation or river sailab, next in importance to a knowledge of the extent of irrigation is to know how much of the unirrigated food crops are grown under an abundant rain-fall.

The leading facts on the subject, shown in the statement appended (summarised for more convenient reference in the foot-note below*), indicate the follow-

* The rain-fall given is that of the head-quarter station of each division. As regards Rawalpindi it exceeds the average of the division; in Peshawar it understates it. For corrections on this point, see the next foot-note, where the fall of each district is given. As regards the two last columns of the statement, it cannot be stated exactly how much sailab land is under food grains, but it may be taken broadly that nearly all is. The area irrigated and not under food grains is added for convenience of reference, as it has an obvious bearing on the subject under discussion.

Division.	Rain-fall.	Harvest.	Area of Food Grains.			Sailab Area.	Area Irrigated which is not Cultivated with Food Crops.
			Total.	Of which Irrigated.	Balance Unirrigated including Sailab.		
Delhi - - -	25.5	Rabi - - -	8,29,665	3,59,775	4,69,890	13,500	1,09,351
		Kharif - - -	10,60,331	1,81,850	8,84,481		
		Total - - -	18,95,996	5,41,625	13,54,371		
Hissar - - -	16.0	Rabi - - -	6,10,140	1,18,210	4,91,930	3,52,610	51,220
		Kharif - - -	23,60,952	49,624	23,11,328		
		Total - - -	29,71,092	1,67,834	28,03,258		
Umballa - - -	35.3	Rabi - - -	8,98,977	1,16,560	7,82,417	16,638	13,450
		Kharif - - -	6,80,031	1,65,815	5,14,216		
		Total - - -	15,79,008	2,82,375	12,96,633		
Jullundur - - -	29.8	Rabi - - -	10,93,359	1,81,080	9,12,276	62,280	74,702
		Kharif - - -	7,92,131	1,59,080	6,33,051		
		Total - - -	18,85,490	3,40,160	15,45,330		
Amritsar - - -	23.1	Rabi - - -	12,27,139	4,32,443	7,94,696	2,24,493	1,11,239
		Kharif - - -	6,12,524	2,69,233	3,43,291		
		Total - - -	18,39,663	7,01,676	11,37,987		
Lahore - - -	18.5	Rabi - - -	12,01,627	6,17,957	5,83,670	1,72,186	1,46,391
		Kharif - - -	7,93,771	2,61,143	5,32,628		
		Total - - -	19,95,398	8,79,100	11,16,298		

(Continued.)

ing results. In the Mooltan division, which has the smallest rain-fall, of 4½ lakhs acres of food crops which are not irrigated nearly the whole is aided by river sailab. In the Derajat division, where the rain-fall is almost as small, of 10½ lakhs unirrigated, nearly one-fourth is sailab; of the remaining three-fourths probably at least half is aided by floods from the Sulaiman range, and the balance is most of it situate in the Bannu district at the north end of the division, where the rain-fall is much above the average of the division.* In the Hissar division, with only 17 inches of rain-fall, the entire cultivation, nearly 3 millions of acres (the proportion irrigated is insignificant), is dependent on rain; and though 3½ lakhs of acres are said to be aided by sailab, the majority is in the Hissar district, where the aid so described is far less certain than on the Punjab rivers. In the remaining divisions the rain-fall is as a rule abundant; but making allowances for those tracts in each division where the contrary is the case, say 3 millions of acres,† and adding that to the area similarly circumstanced in the Hissar division, the cultivation of food grains in the province may be classified for the purposes of the question under reply as follows:—

	Millions of Acres.		
	Irrigated	Not irrigated, in 3 classes,—	
1. Sailab, i.e., usually safe owing to aid received from river floods and percolation -	1½	14	14
	2. Safe, because grown under an abundant and reliable rain-fall -	6½	
	3. Dependent on a less certain rain-fall -	6	
Total - - -	18½		

The proportion of the whole supply of food grains which is produced on irrigated land is a question of some difficulty; for this reason that, as noticed in the reply to Question 3, the annual estimates of crop areas and yield are given in the gross for each district, and do not distinguish the areas and yield of crops under irrigation from that of land not so advantaged. District officers have been asked to state broadly in what ratio the produce (food grains) of 1 acre of irrigated land stands to that of 1 acre of unirrigated. The reply for the whole province is as 3 to 2. Therefore 18½ millions of acres being the average annual area of food grains, and of this 4½ millions being irrigated, it follows that of the total yield one-third is supplied from the irrigated lands and two-thirds from the unirrigated. The figures for each division calculated on the same principle are—

Division.	Rain-fall.	Per cent. of Area under Food Grains which is Irrigated.	In what Ratio does the Produce (Food Crops) of 1 Acre of Irrigated Land stand to that of 1 Acre of Unirrigated in an Average Year.	Of the Average Annual Yield of Food Grains what Per-centage is raised on Irrigated Land.	Remarks.
Delhi - - -	25.5	29	5 to 3	41	* A considerable portion of the division has smaller rain-fall.
Hissar - - -	16.9	6	2 to 1	11	
Umballa - - -	35.3	18	3 to 2	25	
Jullundur - - -	29.8	18	3 to 2	25	
Amritsar - - -	23.1	38	2 to 1	55	
Lahore - - -	18.5	44	3 to 2	54	
Rawalpindi - - -	31.5	10	3 to 2	14	
Mooltan - - -	6.1	65	3 to 2	74	
Derajat - - -	8.0	27	3 to 2	36	
Peshawar - - -	12.9	22	2 to 1	36	
Total - - -	—	25	3 to 2	33	

Division.	Rain-fall.	Harvest.	Area of Food Grains.			Sailab Area.	Area Irrigated which is not Cultivated with Food Crops.
			Total.	Of which Irrigated.	Balance Unirrigated including Sailab.		
Rawalpindi - - -	31.5	Rabi - - -	14,64,572	1,60,874	13,03,698	1,42,778	77,589
		Kharif - - -	9,97,773	77,571	9,20,202		
		Total - - -	24,62,345	2,38,445	22,23,900		
Mooltan - - -	6.1	Rabi - - -	10,34,443	6,12,298	4,22,145	3,75,619	2,88,379
		Kharif - - -	2,67,991	2,33,853	34,138		
		Total - - -	13,02,434	8,46,151	4,56,283		
Derajat - - -	8.0	Rabi - - -	8,47,121	2,59,124	5,87,997	2,63,093	91,310
		Kharif - - -	5,70,426	1,17,358	4,53,068		
		Total - - -	14,17,547	3,76,482	10,41,065		
Peshawar - - -	12.9	Rabi - - -	7,89,386	1,19,087	6,40,299	22,153	44,303
		Kharif - - -	4,11,487	1,34,914	2,76,573		
		Total - - -	11,70,873	2,54,001	9,16,872		
Grand Total - - -	26.2	Rabi - - -	99,66,429	29,77,408	69,89,021	16,35,350	10,97,937
		Kharif - - -	85,53,417	16,50,441	69,02,976		
		Total - - -	1,85,19,846	46,27,849	1,38,91,997		

* Owing to an error which has occurred in the return of the Dera Ismail Khan district, and which was discovered too late for correction, the unirrigated area in this division is considerably over-estimated.

† Delhi division, 700,000 acres. Umballa division, 300,000 acres. Lahore division, 700,000 acres. Rawalpindi division, 1,000,000 acres. Peshawar division, 300,000 acres.

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The following table gives the same data for each district :—

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Division.	District.	Rain-fall at Head Quarters.	Per cent. of Area under Food Grains which is irrigated.	In what Ratio does the Produce (Food Crops) of 1 Acre of Irrigated Land stand to that of 1 Acre of Un-irrigated Land in an Average Year.	Of the Average Annual Yield of Food Grains what Percentage is raised on Irrigated Land.	Division.	District.	Rain-fall at Head-Quarters.	Per cent. of Area under Food Grains which is irrigated.	In what Ratio does the Produce (Food Crops) of 1 Acre of Irrigated Land stand to that of 1 Acre of Un-irrigated Land in an Average Year.	Of the Average Annual Yield of Food Grains what Percentage is raised on Irrigated Land.
Delhi	Delhi	25.5	29	5 to 3	41	Lahore	Lahore	18.5	68	3 to 2	76
	Gurgaon	28.5	18	5 to 3	27		Ferozepore	20.0	18	5 to 3	27
	Karnal	30.4	49	2 to 1	66		Gujranwala	20.3	69	3 to 2	77
Hissar	Hissar	16.9	14	3 to 2	6	Rawalpindi	Rawalpindi	31.5	2	2 to 1	4
	Rohtak	19.2	13	2 to 1	20		Jhelum	18.6	3	3 to 2	4
	Sirsa	14.3	9	2 to 1	6		Gujrat	29.2	14	3 to 2	20
Umballa	Umballa	35.3	17	3 to 2	26	Mooltan	Shahpur	13.0	38	3 to 2	48
	Ludhiana	25.3	1	2 to 1	29		Mooltan	6.1	73	2 to 1	84
	Simla	65.1	7	3 to 2	10		Jhang	10.3	64	3 to 2	73
Jullundur	Jullundur	29.8	27	3 to 2	36	Derajat	Montgomery	8.7	63	4 to 3	69
	Hoshiarpur	33.7	3	3 to 2	4		Muzaffargarh	6.1	57	3 to 2	67
	Kangra	123.6	29	2 to 1	45		D. I. Khan	8.0	19	5 to 4	23
Amritsar	Amritsar	23.1	36	2 to 1	53	Peshawar	D. G. Khan	7.2	65	3 to 2	74
	Sialkot	39.0	57	3 to 2	67		Bannu	12.0	13	2 to 1	23
	Gurdaspur	30.9	18	2 to 1	31		Peshawar	13.9	27	2 to 1	43
							Kohat	20.2	17	3 to 1	38
							Hazara	46.3	13	3 to 2	18

We may carry the question further on the same principle as that applied to the areas, and inquire what proportion of the total produce of unirrigated land is fairly secure, and what proportion depends on a precarious fall. The abundance of the rain-fall in the submontane tracts, and assistance by river sailab or hill floods in other places, will be admitted to have an effect on the yield as compared with that of unirrigated land less advantaged, not dissimilar to the advantage enjoyed by irrigated over unirrigated land.

There is nothing more certain and noteworthy, or more clearly shown by such produce statistics as we possess, than the great difference in yield between the better and worse classes of unirrigated land. But as the classification necessarily adopted is a very broad one, it will be safer not to assume the difference applicable thereto as greater than 3 to 2. The estimate of the extent to which the total yield of food grains in the province is secured against drought will then stand as follows :—

Classification of Cultivation.	Area cultivated, Millions of Acres.	Proportionate Rate of Yield.	Per-centage of Total Yield of Food Grains contributed by each Class.	Total Yield in Maunds (Millions).	Maunds per Acre.
Irrigated land	4½	4.5	36	54	12
Not irrigated, but aided by sailab or floods, or protected by abundant rain-fall.	8	3	43	64	8
Not irrigated, and dependent on a smaller and more precarious rain-fall.	6	2	21	31	5
Total	18½	—	100	149	8.05

NOTE.—The third column of this statement is arrived at thus:—

$$4\frac{1}{2} \times 4.5 = 20\frac{1}{4}$$

$$8 \times 3 = 24$$

$$6 \times 2 = 12$$

$$\text{Total} = 56\frac{1}{4}$$

Then $56\frac{1}{4} : 20\frac{1}{4} :: 100 : 36$, and similarly for the other two items.

To how much of the area is the protection complete and permanent, and how much is dependent on the local rain? Supposing canals, tanks, wells, and jhils to be utilised to the utmost extent, and kept in the highest possible order, what extent of the country would be protected from drought in a year when there is a failure of rain?

I am not certain in what sense the term "protected by irrigation" is used in this question. In the previous portion of this reply I have answered as if it was equivalent to the term "irrigated." In the Irrigation Department a tract is said to be "protected

by irrigation" of which a third part is or can be irrigated in a season of drought by a canal drawn from a permanent river or by wells not liable to dry up.

I shall avoid technicalities of this nature, and confine myself to the actual area irrigated. In the whole

Punjab this is 26 per cent. of the cultivation, or 5½ million acres out of 21 millions. The details of the irrigation are roughly—

	Millions of Acres.	Per cent. of Irrigation.
By wells	3	55
By inundation canals	1	18
By perennial canals	1	14
By small channels and streams	1	11
By tanks and jhils, less than	1	2
Total	5½	100

The complete figures for each division are given in a foot-note below.*

As regards the well irrigation, it will be seen from that foot-note that the greater part of this is situate in submontane districts with a reliable rain-fall. In the Mooltan division, where the contrary is the case, the wells are largely aided by canals or by river sailab. Well cultivation may be said broadly to be never independent of aid by rain or by other means. It is not an absolute insurance against famine—it is only an insurance against its milder forms. In the reply to Question 2 it has been shown that famine is commonly caused by the failure of the kharif harvest followed by the failure of the rabi sowings. A little reflection will show the effect of this upon wells. The well cattle depend for their winter fodder largely on the kharif harvest. All aid from rain failing, they are thrown for support entirely on the produce of the water raised by their labour. At the same time, the winter rains failing, that labour becomes unusually continuous and severe. On the other hand it becomes a question of increasing perplexity to the well owner how he is to feed both his cattle and his own family. There is also this additional trouble, that the drought has made both air and soil so dry that the water does far less irrigating duty than usual. In the end, if the drought really lasts a year; that is to say, if it comes in with the failure of the kharif, and is followed by a similar failure of the winter rains, it is perfectly certain that a vast number of the well cattle will have died of hunger and fatigue before the next autumn rains are due, and that the area before irrigated by the wells will have greatly contracted wherever not aided by canal irrigation. The eventual breaking down of the wells under such circumstances is merely a question of time. In short, the main defect of well irrigation in its relation to famine is, that it depends on animal power, requiring for its support large quantities of fodder. In ordinary years it adds greatly to the agricultural wealth of the country. In bad seasons not amounting to famine it is the saving of the tracts where it exists. In prolonged famine its breaking down is mainly a question of time; at any rate the food supplied by such well irrigation as sur-

vived would bear no proportion to that raised on the well irrigated lands in the previous prosperous seasons.

Canal irrigation possesses no similar drawback. It can be absolutely depended upon in the worst famines; and by far the greater portion of it being by flow, and not by lift, it is applied to the land with little or no expenditure of labour. The heads of the inundation canals are no doubt less to be depended on than those of the perennial canals; but as a matter of experience the irrigation from the inundation canals, when superintended by properly trained canal officers, has proved to be fairly certain; and with the increasing attention paid to them it is likely to prove still more reliable in the future.

The irrigation from the small channels and streams is in most instances certain and reliable; as also that from our great perennial canals, the Bari Doab and Western Jumna.

It remains to explain what would be the probable effect of a year of drought in expanding or contracting the area irrigated from these three classes of canals. The volume of the rivers from which their supply is drawn would be affected, but not materially so, for these rivers have their sources in the glaciers of the Himalayas. The drought reduces the duty which the water is capable of doing; the dryness of the atmosphere increases the rate of evaporation; the soil is more thirsty; and owing to the absence of rain a greater number of waterings is required by each crop. On the other hand everyone has the strongest motives for making the water go as far as possible; so the waste due to carelessness of application in ordinary years is saved. And our canal administration can be depended on to make unusual exertions to send the largest possible amount of water into the canals and to distribute it in the best way.

The following figures of the Western Jumna canal, a canal that irrigates tracts where famine is most felt in this province, furnish remarkable evidence of the stability and elasticity of canal irrigation under the pressure of famine :—

Year.	Acres irrigated.	Remarks.
1822-3	30,749	
1823-4	51,603	Drought
1824-5	38,185	Famine
1825-6	69,320	
1826-7	94,299	
1832-3	2,13,206	Famine.
1833-4	2,19,503	
1836-7	3,90,311	Drought
1837-8	4,54,230	Famine.
1860-1	3,72,600	
1861-2	3,31,000	
1867-8	4,86,800	Famine.
1868-9	3,66,400	
1876-7	5,07,970	Scarcity.
1877-8		

* Details of Punjab irrigation, abstracted from the more complete statement appended to this reply.

Division.	Rain-fall.	Per cent. of Cultivated Area Irrigated.	Detail of Irrigation.						Average Area of Unirrigated Crops.
			Perennial Canals.	Autumnal Inundation Canals.	Wells.	Tanks and Jhils.	Small Channels from Rivers and Streams.	Total Irrigated.	
Delhi	25.5	32	2,24,717	—	2,96,939	98,327	30,933	6,50,976	14,63,350
Hissar	16.9	7	1,58,670	—	32,919	—	27,465	2,19,054	29,98,218
Umballa	35.3	14	3,490	—	1,80,497	25,612	86,226	2,95,825	14,65,906
Jullundur	29.8	21	5,619	—	2,43,649	515	1,65,079	4,14,862	17,42,591
Amritsar	23.1	35	1,71,530	—	6,13,200	10,722	17,463	8,12,915	13,53,491
Lahore	18.5	40	1,40,432	62,967	8,10,939	7,502	3,654	10,25,494	12,87,677
Rawalpindi	31.5	20	—	52,000	2,54,276	—	9,758	3,16,034	25,22,069
Mooltan	6.1	69	—	6,02,403	5,24,297	—	7,830	11,34,530	5,09,335
Derajat	8.0	35	—	2,16,574	1,85,218	—	66,000	4,67,792	11,59,115
Peshawar	12.9	24	35,187	—	34,140	558	2,28,419	2,98,304	9,74,918
Total	—	26	7,39,645	9,33,944	31,76,074	1,43,236	6,42,887	56,35,786	1,54,76,670

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To resume. The well irrigation, 3 millions of acres, would certainly contract greatly under pressure of drought. But it is for the most part situate in submontane tracts, where a complete failure of rain-fall is unusual. That of the Mooltan Division is mostly aided by canals or sailab. The canal irrigation, 2½ millions of acres, on the other hand, would not contract in a year of drought; but on the best managed canals would probably extend. The small area irrigated from tanks and jhils, 1,40,000 acres, would contract very largely.

In conclusion, before leaving this question, the Financial Commissioner desires to bring to the attention of Government the urgency of developing kharif irrigation from the Western Jumna canal in the dry tracts of the Delhi and Hissar Divisions. The reply to Question 2 has shown that, whenever bad years come, it is in this part of the province that they are most severely felt. In the Hissar Division, of a cultivated area of 3 millions of acres, little more than 2,00,000 are irrigated. A scheme is now pending the

sanction of Government whereby kharif irrigation will be supplied from the Western Jumna canal to 25,000 acres in the Karnál District, and 32,000 acres in the Rohtak District, of which the cost is small and the difficulties of execution *nil*. But a much more important scheme was set aside about the year 1871, on reference to the Secretary of State, whereby a kharif irrigation branch would have been taken out from the main line of the Western Jumna canal above Karnál, and have been carried into the eastern portion of the Sirsa District. This branch would water from 1,50,000 to 2,00,000 acres in the most famine-stricken tract in the Punjab. The scheme would cost 20 lakhs, and would probably yield an annual gross revenue of from 3 to 4 lakhs.* It has hitherto been *set aside* because it was inconvenient to provide the money, and because other works were in progress on the Western Jumna canal. But judging by the results of the famines of 1860-61 and 1868-69, and of the late scarcity in 1877-78, it is probable that no canal extension can be either more urgent or more profitable than this. If this scheme is carried out, and if a further extension of irrigation in the western end of the Sirsa District can be obtained by means of the Abohar branch of the Sirhind canal, very important progress will have been made towards protecting the Hissar Division from famine.

* These data have been obtained from the Irrigation Department.

What is the effect of the irrigation of crops other than food crops in addiny to the powers of the population to resist famine?

It has been stated above that of 5½ millions of acres irrigated all but one million is devoted to the cultivation of food grains. I propose to answer this question by giving such information as is available concerning the crops of which this one million not devoted to food grains is made up. This can be done mainly by the aid of the crops statement appended to Question 3. We know that the entire crop of indigo and nearly all the sugar-cane is irrigated; the same is true of poppy, tobacco, turmeric, coriander seed, ginger, and chillies. Of vegetables also the major portion is cultivated on irrigated land. And the annual cotton report for 1876-77 shows that of the cotton crop more than 3,50,000 acres are irrigated. These items added together total—

	Acres.
Indigo - - -	101,650
Sugar-cane - - -	356,142
Cotton - - -	350,000
Vegetables (say half the area returned) - - -	132,500
Poppy - - -	11,042
Tobacco - - -	71,698
Turmeric - - -	3,508
Coriander seed, ginger, and chillies - - -	23,743
Total - - -	<u>1,050,283</u>

If we omit indigo and poppy, there is not one of these crops which is not as necessary to the sustenance of the people as the ordinary food grains. The area under the valuable crops of indigo and poppy is insignificant compared with the total area ($5\frac{1}{2}$ millions) irrigated. Moreover, cotton excepted, of which the cultivation is easy, we may say that these crops represent the efforts of the best cultivators of the province. And they are far more profitable than the ordinary food crops.

STATEMENT showing for each DISTRICT in the PUNJAB the EXTENT to which each DISTRICT is PROTECTED by IRRIGATION, and the PROPORTION of that AREA devoted to FOOD CROPS; the RATIO by which IRRIGATION increases the YIELD of LAND; and the PROPORTION of the TOTAL YIELD of FOOD GRAINS due to IRRIGATION; also AREA still UNCULTIVATED, and TOTAL POPULATION.

Prefatory Remarks.—In the cultivated area double crop lands are reckoned twice, so that the acreage given is the gross acreage of the annual crops.

Columns 12 to 21 have been filled in from the replies received from District Officers. In columns 22-27 the total areas are the same as those given in the statement of crops appended to the reply to Question 3; the irrigated areas are copied from columns 12 to 21 of this statement; and the unirrigated areas are the difference.

The total areas given in columns 21 and 27 disagree by the amount stated in column 28. The total difference between these columns for the whole province is $2\frac{1}{2}$ per cent.; in all but eight Districts the two columns agree approximately; and were a little more time at my disposal, it would be easy to eliminate the discrepancies by reference to district officers. But the total difference being only $2\frac{1}{2}$ per cent., it seems scarcely worth while to do so, more especially as from the manner in which the irrigated areas in columns 22-27 have been reckoned, it is certain that the irrigated areas have not been over-estimated.

STATEMENT showing for each District in the PUNJAB the EXTENT to which CULTIVATION is protected by IRRIGATION, and the PROPORTION of that AREA devoted to FOOD CROPS; the RATIO by which IRRIGATION increases the YIELD of LAND; and the PROPORTION of the TOTAL YIELD of FOOD GRAINS due to IRRIGATION; also AREA still UNCULTIVATED, and TOTAL POPULATION.

1.	2.	3.	POPULATION BY CENSUS OF 1868.		4.	5.	6.	7.	8.	9.	10.	11.	DETAIL OF CULTIVATED AREA (IN ACRES) SHOWING SOURCE OF IRRIGATION.															DISTRIBUTION OF IRRIGATION BETWEEN FOOD GRAINS AND OTHER CROPS.										29.	30.	31.
DIVISION.	District.	Total Souls.	Per Square Mile of		Total Cultivation.	Irrigation.	Average Annual Rain-fall.	PERCENTAGES ON CULTIVATION.			Total Area in Acres.	AVERAGE ACREAGE OF CROPS.															In what Ratio does the Produce (Food Crops) of 1 Acre of Irrigated Land bear to that of 1 Acre of Unirrigated in an Average Year.										Per cent. of Area under Food Grains which is Irrigated.	Of the Average Annual Yield of Food Grains what Percentage is probably raised on irrigated land.		
			Of Uncultivated Land.	Of Irrigated Cultivation.				Of Sahab Cultivation.	Of Cultivation dependent solely on Rain.	IRRIGATED BY						Total Average Area of Crops.	Food Grains.										Total Cultivation.	No. of Acres by which previous Column exceeds Column 21. or is less than Column 21.												
										Perennial Canals.		Autumnal Canals.	Wells.	Tanks and Jills.	Small Channels from Rivers and Streams.		Total Irrigated.	Unirrigated but aided by Mineral Pools and River (Sahab).	Entirely dependent on Rain.	Spring.	Autumn.	Total.	Other Produce.																	
DELHI.	Delhi.	608,550	634	2,008	25.5	63	37	2	61	817,819	Rabi - 30,616 Food Grains and Kharif 31,133 Pulses. { Total 70,749 Other Produce - 24,397 Total - 95,146	Perennial Canals. - Autumnal Canals. - Wells. 35,631 Tanks and Jills. 28,361 Small Channels from Rivers and Streams. 4,719 Total Irrigated. 81,578	Unirrigated but aided by Mineral Pools and River (Sahab). - Entirely dependent on Rain. -	Total Average Area of Crops. 518,402	Irrigated - 84,578 Unirrigated 182,408 Total - 268,986	Spring. 64,113 Autumn. 174,304 Total. 238,417	Other Produce. 45,174 Total Cultivation. 356,712	183,805 380,930 574,824 + 56,362	5 to 3	20	41																			
DELHI.	Gurgaon.	607,341	881	2,340	28.2	31	19	-	81	1,207,332	Rabi - 12,807 Food Grains and Kharif 5,174 Pulses. { Total 18,041 Other Produce - 4,015 Total - 22,056	Perennial Canals. - Autumnal Canals. - Wells. 78,095 Tanks and Jills. 8,933 Small Channels from Rivers and Streams. 30,540 Total Irrigated. 106,675	Unirrigated but aided by Mineral Pools and River (Sahab). - Entirely dependent on Rain. -	Total Average Area of Crops. 989,478	Irrigated - 196,135 Unirrigated 193,707 Total - 389,842	Spring. 30,540 Autumn. 567,951 Total. 933,333	Other Produce. 24,071 Total Cultivation. 65,383	190,746 832,041 1,022,787 + 53,009	5 to 3	18	27																			
	Karnal.	610,927	482	1,468	30.4	132	30	1	60	1,505,171	Rabi - 44,423 Food Grains and Kharif 40,713 Pulses. { Total 85,171 Other Produce - 82,144 Total - 107,315	Perennial Canals. - Autumnal Canals. - Wells. 74,344 Tanks and Jills. 35,787 Small Channels from Rivers and Streams. 10,474 Total Irrigated. 130,602	Unirrigated but aided by Mineral Pools and River (Sahab). - Entirely dependent on Rain. -	Total Average Area of Crops. 684,000	Irrigated - 130,602 Unirrigated 88,775 Total - 229,387	Spring. 87,107 Autumn. 148,226 Total. 235,333	Other Produce. 40,106 Total Cultivation. 290,350	266,365 250,350 516,715 - 107,394	2 to 1	40	66																			

CHAP. I. Qn. 4.
PUNJAB.
Major Wace.

Statement showing for each District in the Punjab the Extent to which Cultivation is protected by Irrigation—continued.

1.	2	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	24.	25.	26.	27.	28.	29.	30.	31.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
Division.	District.	Total Souls.	Population by Censuses of 1881.	Per Square Mile of	Average Annual Rain-fall.	PERCENTAGES ON CULTIVATION.				Total Area in Acres.	DETAIL OF CULTIVATED AREA (IN ACRES) SHOWING SOURCE OF IRRIGATION.										DISTRIBUTION OF IRRIGATION BETWEEN FOOD GRAINS AND OTHER CROPS.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
						Total Cultivation.	Of Uncultivated Land.	Of Irrigated Cultivation.	Of Salub Cultivation.		Of Cultivation dependent solely on Rain.	Irrigated by						Total Irrigated.	Unirrigated but aided by Alluvial Floods and Percolation from River (Salub).	Entirely dependent on Rain.	Total Acreage Area of Crops.	Food Grains.				Other Produce.	Total Cultivation.	No. of Acres by which previous Column exceeds Column 21.	In what Ratio does the Produce (Food Crops) of 1 Acre of Unirrigated Land to that of 1 Acre of Irrigated Land or is less than Column 21.	Per cent. of Area under Food Grains which is Irrigated.	Of the Average Annual Yield of Food Grains what Percentage is probably raised on Irrigated Land.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
												Perennial Canals.	Autumnal Inundation Canals.	Wells.	Tanks and Jills.	Small Channels from Rivers and Streams.	Total					Spring.	Autumn.	Total.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
Hissar -	434,631	242	4,406	16.9	77	5	23	72	2,205,423	(Rabi - 31,890 Food Grains and Pulses. 13,561 Total 45,451 Other Produce - 12,174 Total - 62,628	863 122 985 423 1,423	- - - - -	- - - - -	- - - - -	4,320 800 5,120 1,000 6,120	37,073 19,186 56,559 13,612 70,171	201,004 201,257 1,282,532																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															

Statement showing for each District in the Punjab the Extent to which Cultivation is protected by Irrigation—continued.

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	24.	25.	26.	27.	28.	29.	30.	31.	
DIVISION.	District.	POPULATION BY CENSUS OF 1881.		Per Square Mile of	Average Annual Rain-fall.	PER-CENTAGES ON CULTIVATION.				Total Area in Acres.	DETAIL OF CULTIVATED AREA (IN ACRES) SHOWING SOURCE OF IRRIGATION.										DISTRIBUTION OF IRRIGATION BETWEEN FOOD GRAINS AND OTHER CROPS.										
		Total Souls.	Total Cultivation.			Irrigation.	Of Uncultivated Land.	Of Irrigated Cultivation.	Of Salub Cultivation.		Of Cultivation dependent solely on Rain.	AVERAGE ACREAGE OF CROPS.						Total Area of Crops.	Food Grains.					Other Produce.	Total Cultivation.	No. of Acres by which previous Column exceeds Column 21.	In what Ratio does the Produce (Food Crops) of 1 Acre of Unirrigated Land to that of 1 Acre of Irrigated Land or is less than Column 21.	Per cent. of Area under Food Grains which is Irrigated.	Of the Average Annual Yield of Food Grains raised on Irrigated Land.		
												Perennial Canals.	Autumnal Inundation Canals.	Wells.	Tanks and Jills.	Small Channels from Rivers and Streams.	Total Irrigated.		Unirrigated but aided by Alluvial Floods and Percolation from River (Salub).	Entirely dependent on Rain.											
UMBALLA.	Umballa.	1,033,488	635	3,703	15.3	88	13	1	81	1,677,237	Rabi - 1,303 Food Grains and Pulses. 2,185 Total 3,488	3,487	270	8,904	21,345	30,219	16,566	23,394	40,613	64,007	104,620	Irrigated - 23,394 Unirrigated 184,432	207,826	720,509	878,333	61,966	940,301	21,334	2 to 1	3	6
	Ludhiana.	583,245	521	3,136	25.3	23	17	1	82	875,761	Rabi - 1,303 Food Grains and Pulses. 2,185 Total 3,488	3,487	270	8,904	21,345	30,219	16,566	23,394	40,613	64,007	104,620	Irrigated - 23,394 Unirrigated 184,432	207,826	720,509	878,333	61,966	940,301	21,334	2 to 1	3	6
	Simla.	33,905	1,009	33,905	33.7	9	6	1	94	11,520	Rabi - 1,303 Food Grains and Pulses. 2,185 Total 3,488	3,487	270	8,904	21,345	30,219	16,566	23,394	40,613	64,007	104,620	Irrigated - 23,394 Unirrigated 184,432	207,826	720,509	878,333	61,966	940,301	21,334	2 to 1	3	6

CHAP. I. Qn. 4.
PUNJAB.
Major Wace.

CHAP. I. QN. 4.
PUNJAB.
Major Wace.

Statement showing for each District in the Punjab the Extent to which Cultivation is protected by Irrigation—continued.

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	24.	25.	26.	27.	28.	29.	30.	31.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
Division.	District.	Total Souls.	POPULATION BY CENSUS OF 1901.		Average Annual Rain-fall.	PER-CENTAGES OF CULTIVATION.				Total Area in Acres.	DETAIL OF CULTIVATED AREA (IN ACRES) SHOWING SOURCE OF IRRIGATION.										DISTRIBUTION OF IRRIGATION BETWEEN FOOD GRAINS AND OTHER CROPS.										In what Ratio does the Produce (Food Crops) of 1 Acre of Irrigated Land to that of 1 Acre of Unirrigated Land.	Per cent. of Area under Food Grains which is Irrigated.	Of the Average Annual Yield of Food Grains what Percentage is probably raised on Irrigated Land.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
			Total Cultivation.	Per Square Mile of		Of Uncultivated Land.	Of Irrigated Cultivation.	Of Salub Cultivation.	Of Cultivation dependent solely on Rain.		AVERAGE ACREAGE OF CROPS.						Food Grains.				Other Produce.		Total.	No. of Acres by which previous Column exceeds Column 21.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
											Perennial Canals.	Autumnal Inundation Canals.	Wells.	Tanks and Jhis.	Small Channels from Rivers and Streams.	Total Irrigated.	Unirrigated but aided by Alluvial Floods and Percolation from River (Salub).	Entirely dependent on Rain.	Total Average Area of Crops.	Spring.	Autumn.	Total.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
Jullundur	Jullundur	794,764	758	2,271	29.8	39	33	4	63	848,825	(Rabi - Food Grains and Pulses. Total	111,574	—	68,007	—	—	—	68,007	—	—	27,280	419,050	670,509	Irrigated - Unirrigated Total	111,574 267,894 379,468	68,007 227,946 296,553	180,181 495,840 676,021	43,908 57,373 101,371	224,179 553,213 777,392	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

CHAP. I. QN. 4.
PUNJAB.
Major Wace.

Statement showing for each District in the Punjab the Extent to which Cultivation is protected by Irrigation—continued.

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.	21.	DISTRIBUTION OF IRRIGATION BETWEEN FOOD GRAINS AND OTHER CROPS.										29.	30.	31.																
Division.	District.	Total Souls.	POPULATION BY CENSUS OF 1881.		Average Annual Rain-fall.	PERCENTAGES OF CULTIVATION.				Total Area in Acres.	AVERAGE ACREAGE OF CROPS.										DETAIL OF CULTIVATED AREA (IN ACRES) SHOWING SOURCE OF IRRIGATION.										22.	23.	24.	25.	26.	27.	28.	29.	30.	31.									
			Total Cultivation.	Per Square Mile of		Of Uncultivated Land.	Of Irrigated Cultivation.	Of Salub Cultivation.	Of Cultivation dependent solely on Rain.		Irrigated by					Total Acreage Area of					DETAIL OF CULTIVATED AREA (IN ACRES) SHOWING SOURCE OF IRRIGATION.																												
												Perennial Canals.	Autumnal Inundation Canals.	Wells.	Tanks and Jhis.	Small Channels from Rivers and Streams.	Total Irrigated.	Unirrigated but aided by Alluvial Floods and Percolation from River (Salub).	Entirely dependent on Rain.	Total Acreage Area of Crops.	Food Grains.					Other Produce.		Total Cultivation.	No. of Acres by which previous Column exceeds Column 21.					In what Ratio does the Produce (Food Crops) of 1 Acre of Irrigated Land to that of 1 Acre of Unirrigated Land.					Per cent. of Area under Food Grains which is Irrigated.					Of the Average Annual Yield of Food Grains what Percentage is probably raised on Irrigated Land.					
																						Spring.		Autumn.		Total.	Other Produce.		Total Cultivation.	No. of Acres by which previous Column exceeds Column 21.					In what Ratio does the Produce (Food Crops) of 1 Acre of Irrigated Land to that of 1 Acre of Unirrigated Land.					Per cent. of Area under Food Grains which is Irrigated.					Of the Average Annual Yield of Food Grains what Percentage is probably raised on Irrigated Land.				
AMRITSAR.	Amritsar	1,083,591	1,018	2,623	23.1	57	39	3	58	999,686	(Rabi - Food Grains and Pulses. Total	53,203	—	85,018	27	13	138,261	22,154	394,666	680,920	Irrigated - Unirrigated Total	138,261 254,003 392,264	69,130 115,817 184,947	207,391 369,820 577,211	57,279 48,251 105,530	264,670 418,071 682,741 + 1,821						2 to 1	36	53															
	Sialkot	1,005,005	758	1,511	50.0	54	50	10	40	1,231,551	(Rabi - Food Grains and Pulses. Total	—	—	240,115	3,069	3,069	246,170	84,404	337,872	847,921	Irrigated - Unirrigated Total	246,170 215,166 461,336	140,071 76,856 216,927	386,241 292,022 678,263	39,404 85,960 125,364	425,645 377,982 803,627 - 44,294						3 to 2	57	67															
	Gurdaspur	655,292	549	3,413	30.9	53	16	15	69	1,163,589	(Rabi - Food Grains and Pulses. Total	14,915	—	51,327	1,585	185	48,012	117,935	593,122	703,657	Irrigated - Unirrigated Total	48,012 325,527 373,539	60,682 150,618 210,650	108,644 476,145 584,189	14,556 81,293 95,849	122,600 557,438 680,098 - 83,619						2 to 1	18	31															

CHAP. I. QN. 4.
PUNJAB.
Major Wace.

Statement showing for each District in the Punjab the Extent to which Cultivation is protected by Irrigation—continued.

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	24.	25.	26.	27.	28.	29.	30.	31.			
Division.	District.	POPULATION BY CENSUS OF 1931.				PERCENTAGES ON CULTIVATION.				Total Area in Acres.	DETAIL OF CULTIVATED AREA (IN ACRES) SHOWING SOURCE OF IRRIGATION.										DISTRIBUTION OF IRRIGATION BETWEEN FOOD GRAINS AND OTHER CROPS.												
		Total Souls.	Total Cultivation.	Per Square Mile of	Average Annual Rain-fall.	Of Uncultivated Land.	Of Irrigated Cultivation.	Of Salab Cultivation.	Of Cultivation dependent solely on Rain.		Irrigated by						Total Acreage Area of Crops.	Food Grains.				Other Produce.	Total Cultivation.	No. of Acres by which previous Column exceeds Column 21	In what Ratio does the Produce (Food Crops) of 1 Acre of Irrigated Land to that of 1 Acre of Unirrigated in an Average Year.	Per cent. of Area under Food Grains which is Irrigated.	Of the Average Annual Yield of Food Grains what Percentage is probably raised on Irrigated Land.						
											Perennial Canals.	Autumnal Inundation Canals.	Wells.	Tanks and Khils.	Small Channels and Streams.	Total Irrigated.		Unirrigated but aided by Alluvial Floods and Percolation from River (Salab).	Entirely dependent on Rain.	Spring.	Autumn.							Total.					
LAHORE.	Lahore.	789,666	411	1,111	18.5	94	37	9	54	2,341,438	Food Grains and Pulses. Other Produce Total	90,765	16,611	100,967	—	—	—	277,343	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
		36,067	2,000	101,594	—	—	—	—	139,661	—		—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
		126,832	19,611	271,561	—	—	—	—	417,004	—		—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
		13,600	2,887	21,649	—	—	—	—	38,136	—		—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
												140,432	21,493	293,210	—	—	—	455,140	106,089	667,439	1,228,668												
LAHORE.	Ferozepore.	549,251	276	1,941	20.0	40	14	3	83	1,753,250	Food Grains and Pulses. Other Produce Total	—	—	21,513	86,434	—	—	—	107,977	—	—	—	—	—	—	—	—	—	—	—	—	—	
		—	—	—	—	—	—	—	18,513	47,763		—	—	—	—	—	—	—	66,203	—	—	—	—	—	—	—	—	—	—	—	—	—	
		—	—	—	—	—	—	—	40,065	134,216		—	—	—	—	—	—	—	174,272	—	—	—	—	—	—	—	—	—	—	—	—	—	
		—	—	—	—	—	—	—	1,413	5,226		—	—	—	—	—	—	—	—	6,638	—	—	—	—	—	—	—	—	—	—	—	—	
											—	41,439	135,442	—	—	—	150,910	42,983	1,031,034	1,274,978													
GUJRANWALA.	Gujranwala.	550,676	637	904	26.3	203	70	4	26	1,640,223	Food Grains and Pulses. Other Produce Total	—	—	—	232,227	—	—	—	410	232,637	—	—	—	—	—	—	—	—	—	—	—	—	
		—	—	—	—	—	—	—	44,475	7,502		—	—	—	—	—	—	—	3,210	53,187	—	—	—	—	—	—	—	—	—	—	—	—	
		—	—	—	—	—	—	—	276,702	7,502		—	—	—	—	—	—	—	3,620	287,824	—	—	—	—	—	—	—	—	—	—	—	—	
		—	—	—	—	—	—	—	101,585	7,502		—	—	—	—	—	—	—	34	101,619	—	—	—	—	—	—	—	—	—	—	—	—	
											—	378,287	7,502	3,654	889,443	23,114	140,925	553,482															

CHAP. I. QN. 4.
PUNJAB.
Major Wace.

Statement showing for each District in the Punjab the Extent to which Cultivation is protected by Irrigation—continued.

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	24.	25.	26.	27.	28.	29.	30.	31.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
DIVISION.	District.	Total Souls.	POPULATION BY CENSUS OF 1931.		Average Annual Rain-fall.	PERCENTAGES ON CULTIVATION.			Total Area in Acres.	AVERAGE ACREAGE OF CROPS.										DISTRIBUTION OF IRRIGATION BETWEEN FOOD GRAINS AND OTHER CROPS.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																												
			Per Square Mile of	Total Cultivation.		Of Uncultivated Land.	Of Irrigated Cultivation.	Of Cultivation dependent solely on Rain.		Irrigated by						Unirrigated but aided by Alluvial Floods and Percolation from River (Salab).	Entirely dependent on Rain.	Total Acreage Area of Crops.	Food Grains.				Other Produce.	Total Cultivation.	No. of Acres by which previous Column exceeds Column 21.	In what Ratio does the Produce (Food Crops) of 1 Acre of Irrigated Land to that of 1 Acre of Unirrigated in an Average Year.	Per cent. of Area under Food Grains which is Irrigated.	Of the Average Annual Yield of Food Grains what Percentage is probably raised on Irrigated Land.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
										Perennial Canals.	Autumnal Inundation Canals.	Wells.	Tanks and Khils.	Small Channels from Rivers and Streams.	Total Irrigated.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
RAWALPINDI.	Rawalpindi.	711,256	546	23,456	31.5	379	2	1	98	3,679,697	Food and Grains and Pulses. (Total) Other Produce Total	—	—	—	—	—	1,231	14,392	725	817,110	885,992	Irrigated - Unirrigated Total	441,479	333,435	775,014	1,505	16,137	—	—	—	—	—	—																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
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Statement showing for each District in the Punjab the Extent to which Cultivation is protected by Irrigation—continued.

Statement showing for each District in the Punjab the Extent to which Cultivation is protected by Irrigation—continued.

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.	21.	22.	23.	24.	25.	26.	27.	28.	29.	30.	31.								
DIVISION.	District.	POPULATION BY CENSUS OF 1881.		Average Annual Rain-fall.	PERCENTAGES ON CULTIVATION.					Total Area in Acres.	DETAIL OF CULTIVATED AREA (IN ACRES) SHOWING SOURCE OF IRRIGATION.															DISTRIBUTION OF IRRIGATION BETWEEN FOOD GRAINS AND OTHER CROPS.										In what Ratio does the Produce (Food Crops) of 1 Acre of Irrigated Land to that of 1 Acre of Unirrigated Land in Average Year.	Per cent. of Area under Food Grains which is Irrigated.	Of the Average Annual Yield of Food Grains what Percentage is probably raised on Irrigated Land.
		Total Souls.	Total Cultivation.		Per Square Mile of	Of Uncultivated Land.	Of Irrigated Cultivation.	Of Sahab Cultivation.	Of Cultivation dependent solely on Rain.		IRRIGATED BY						Total Area of Crops.	Total Cultivation.	Other Produce.	Total.	Autumn.	Spring.																
											Perennial Canals.	Artificial Inundation Canals.	Wells.	Tanks and Khils.	Small Channels from Rivers and Streams.	Total Irrigated.							Unirrigated but aided by Alluvial Floods and Percolation from River (Sahab).	Entirely dependent on Rain.														
DERAFT.	Dera Ghazi Khan.	308,831	455	794	7-2	369	57	10	33	3,038,312	Rabi - Food Grains and Pulses. Total Other Produce - Total	-	-	37,503	89,321	-	-	117,551	-	41,603	144,000	435,954	Irrigated - Unirrigated Total	117,524 34,166 151,690	70,958 63,464 137,422	188,482 100,630 289,112	60,510 5,609 65,910	248,792 103,239 355,031	-78,023	3 to 2	65	74						
DERAFT.	Bannu	287,647	382	2,063	12-0	332	15	13	72	2,029,446	Rabi - Food Grains and Pulses. Total Other Produce - Total	-	-	-	1,600	-	37,000	38,600	-	62,000	330,000	470,000	Irrigated - Unirrigated Total	38,600 235,556 324,156	19,400 117,417 136,817	58,000 402,973 460,973	11,000 11,125 22,125	69,000 414,098 483,098	+13,098	2 to 1	13	23						
PESHAWAR.	Peshawar	523,152	369	1,530	12-9	93	25	8	72	1,508,414	Rabi - Food Grains and Pulses. Total Other Produce - Total	-	-	-	9,703	370	72,501	82,576	-	62,056	631,207	859,450	Irrigated - Unirrigated Total	82,576 422,327 504,903	97,991 62,664 160,655	180,567 484,901 665,468	30,890 24,631 55,521	217,387 509,622 727,009	-132,441	2 to 1	27	43						

Statement showing for each District in the Punjab the Extent to which Cultivation is protected by Irrigation—continued.

[illegible]

CHAP. I. QN. 4.
PUNJAB.
Major Wace.

Statement showing for each District in the Punjab the Extent to which Cultivation is protected by Irrigation—continued.

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.	DISTRIBUTION OF IRRIGATION BETWEEN FOOD GRAINS AND OTHER CROPS.				25.	26.	27.	28.	29.	30.						
DIVISION.	POPULATION BY CENSUS OF 1881.		Total Souls.	Irrigation.	PERCENTAGES ON CULTIVATION.				Total Area in Acres.	DETAIL OF CULTIVATED AREA (IN ACRES) SHOWING SOURCE OF IRRIGATION.										AVERAGE ACREAGE OF CROPS.										DISTRIBUTION OF IRRIGATION BETWEEN FOOD GRAINS AND OTHER CROPS.				In what Ratio does the Produce of Crops of 1 Acre of Irrigated Land to that of 1 Acre of Unirrigated Land in an Average Year.	Of the Average Annual Yield of Food Grains what Percentage is probably raised on irrigated Land.
	Total Cultivation.	Per Square Mile of			Of Uncultivated Land.	Of Irrigated Cultivation.	Of Salub Cultivation.	Of Cultivation dependent solely on Rain.		Irrigated by					Total Irrigated.	Unirrigated but aided by Alluvial Floods and Percolation from River (Salub).	Entirely dependent on Rain.	Total Average Area of Crops.	Food Grains.	Total.	Other Produce.	Total Cultivation.	No. of Acres by which previous Column exceeds Column 20.												
										Perennial Canals.	Autumnal Irrigation Canals.	Wells.	Tanks and Jills.	Small Channels from Rivers and Streams.																					
Rawalpindi -	2,107,357	578	11,074.28	408	20	8	72	10,788,251	Food Grains and Pulses.	(Rabi - Kharif Total Other Produce - Total -	13,000	141,643	—	2,593	77,571	100,574	6,231	2,276,346	2,735,188	Irrigated - Unirrigated Total -	100,574 1,393,698 1,464,572	77,571 920,202 997,773	238,415 2,223,900 2,462,315	77,580 293,160 375,738	316,034 2,522,060 2,838,103	+102,945	3 to 2	10	14						
Mooltan	1,471,579	584	852	714	69	23	8	12,900,319	Food Grains and Pulses.	(Rabi - Kharif Total Other Produce - Total -	298,974	310,600	—	2,721	612,208	2,724	1,134,330	375,619	1,622,401	Irrigated - Unirrigated Total -	612,208 422,145 1,034,443	233,853 34,138 267,991	846,151 456,283 1,302,434	293,379 53,032 341,431	1,134,530 500,335 1,643,865	+14,464	3 to 2	65	74						
Derajat -	591,342	465	1,713	911	605	35	19	46	9,004,532	Food Grains and Pulses.	(Rabi - Kharif Total Other Produce - Total -	72,203	140,921	—	37,000	259,124	—	—	1,365,054	Irrigated - Unirrigated Total -	250,124 453,987 647,121	117,358 453,068 570,426	370,482 1,041,065 1,417,547	91,310 118,050 209,360	467,792 1,159,115 1,626,907	+209,953	3 to 2	27	36						

CHAP. I. QN. 4.
PUNJAB.
Major Wace.

Statement showing for each District in the Punjab the Extent to which Cultivation is protected by Irrigation—continued.

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.	DISTRIBUTION OF IRRIGATION BETWEEN FOOD GRAINS AND OTHER CROPS.						23.	24.	25.	26.	27.	28.	29.	30.		
Division.	POPULATION BY CENSUS OF 1901.		Per Square Mile of	Irrigation.	PERCENTAGES ON CULTIVATION.				Total Area in Acres.	DETAIL OF CULTIVATED AREA (IN ACRES) SHOWING SOURCE OF IRRIGATION.										AVERAGE ACREAGE OF CROPS.						In what Ratio does the Produce of Crops of 1 Acre of Irrigated Land to that of 1 Acre of Unirrigated Land in an Average Year.						Of the Average Annual Yield of Food Grains what Percentage is probably raised on irrigated land.			
	Total Souls.	Total Cultivation.			Of Unirrigated Land.	Of Irrigated Cultivation.	Of Salub Cultivation.	Of Cultivation dependent solely on Rain.		Irrigated by						Total Irrigated.	Unirrigated but aided by Alluvial Floods and Percolation from River (Salub).	Entirely dependent on Rain.	Total Average Area of Crops.	Food Grains.			Other Produce.	Total.	No. of Acres by which previous Column exceeds Column 20.										
										Perennial Canals.	Autumnal Irrigation Canals.	Wells.	Tanks and Jills.	Small Channels from Rivers and Streams.	Spring.					Autumn.	Total.														
Peshāwar -	1,035,780	620	3.127	20.5	203	24	2	74	5,229,549	Rabi - Food Grains and Pulses. Other Produce - Total -	20,693 11,345 32,038 3,140 35,137	- - - - -	10,377 12,980 23,257 10,883 34,140	370 130 500 53 553	87,637 110,520 108,206 30,213 258,419	110,687 131,914	-	-	-	1,066,023	1,386,480	Irrigated - Unirrigated - Total -	110,687 610,230 720,386	131,914 276,573 411,487	254,001 916,872 1,170,873	44,302 58,046 102,349	238,304 974,918 1,273,222	-	-	-	113,358	2 to 1	22	36	
Grand Total	17,612,621	518	2.000	20.2	107	26	8	66	63,016,854	Rabi - Food Grains and Pulses. Other Produce - Grand total -	357,813 237,562 595,375 144,270 730,645	422,331 209,989 632,320 241,624 935,944	- - - - -	1,883,507 705,463 2,650,062 626,012 3,176,074	65,555 55,143 130,038 22,528 148,226	174,112 321,282 509,394 73,498 612,887	2,977,108 1,650,441 4,627,549	-	-	-	1,635,300	1,635,563	Irrigated - Unirrigated - Grand total	2,977,108 1,650,441 4,627,549	1,650,441 13,591,597 15,242,038	254,001 1,531,673 1,785,674	44,302 1,007,507 1,051,809	238,304 1,476,070 1,714,374	-	-	-	113,358	3 to 2	22	33

CHAP. I. QN. 4. EXTRACT from a MEMORANDUM by R. E. EGERTON, Esquire, Financial Commissioner of the Punjab, dated September 1870, showing the difficulties involved in any attempt to extend irrigation rapidly.

PUNJAB.
Major Wacc.

Of the classes of works mentioned in para. 4 of the letter from the Secretary to the Government of India, wells are the most important in the Punjab. The only other works connected with irrigation which have been hitherto constructed by the people are inundation canals, small irrigation channels taken from hill streams, and embankments for storing water. The inundation canals have in nearly all districts been placed under the management of the Canal Department. No new works of this class are undertaken except under the management of the officers of the Irrigation Department.

Works of—

- (2.) Drainage.
- (3.) Reclaiming land from rivers.
- (4.) Protection of land from floods.
- (5.) Works for reclaiming and clearing waste lands will be noticed further on.
- (6.) Clearing land from stones and other obstacles to cultivation. There is not at present any demand for advances to clear such lands, as the amount of waste land unincumbered with such obstacles is sufficient for all demands, and it is evident that the lands which cost least for clearing are likely to be cultivated before those lands which require more outlay to bring them into cultivation.

The subject of wells should therefore be first considered.

Proposals have been made on several occasions for the extension of irrigation from wells by means of a system of takkavi advances for whole districts or tracts of country. Mr. Prinsep, in his letter, regarding water advantage rate on lands irrigated from the Khánwáh canal, and more fully still in a pamphlet recently published, pages 33-39, proposes to make advances to the extent of 140 lacs to construct 60,000 wells, to irrigate 1,800,000 acres of land in the Amritsar and Lahore Divisions, and in a portion of Rawalpindi Division.

Major Tighe, in his letter No. 155, dated 16th June 1870, to Commissioner, Umballa Division, proposes a Government loan to Zamindars at 5 per cent. per annum, repayable with interest in instalments extending over 24 years, on the security of wells and land. He proposes in this way to irrigate 250,000 acres, and to advance Rs. 8,000,000 for this purpose.

There is no doubt that it would be very profitable to the State to extend irrigation from wells in the manner and to the extent proposed by both Mr. Prinsep and Major Tighe; but it is not practicable to do so, I think, within the time contemplated in either scheme.

In neither of the proposals has anything more than the irrigable area and the cost of the masonry shafts of the wells been considered.

It has been assumed that all the other requisites for the extension of irrigation to the enormous extent set forth in the two proposals* exist already; but it is not shown that there are cattle, or cultivators, or labourers, or artizans enough for the construction and working of wells on anything like the scale proposed. To take Major Tighe's proposal alone, he shows that the number of masonry wells now existing in the Umballa District is 4,798. He proposes to add three times that number to the district in a few years.

The returns of stock in Umballa† show that there are 495,000 cows and bullocks in the district. Supposing that of this number one fourth are bullocks fit for working wells,—this gives 1,23,750 bullocks,—of these, at 4 pair per existing well, 39,824 are now employed in irrigation; balance of bullocks available, 83,826. To work 16,000 new wells 44,174 bullocks are required, in addition to the present assumed number available. To provide the bullocks (44,174 × 50 Rs.) = Rs. 22,08,700 are required, and these must be purchased. Again, the number of artizans employed to provide apparatus for the wells must be very largely increased if the number of wells is increased to the extent contemplated. The census returns of the Umballa District show a very large population of tanners, for here the lao and charas are chiefly in use. The Sialkote returns show a very large number of potters, for in that district there are more than double the number of wells which the Umballa District possesses, and these are all worked by Persian wheels. It is not practicable to give reliable calculations of the proportion in which the number of artizans who provide the well apparatus must be increased to meet the demand caused by the immense extension of well irrigation; but there is no question that the number must be increased very largely.

In the case of Mr. Prinsep's proposal, which extends over the area of several districts, there will be a similar necessity for investment of capital in cattle, and for increase in the number of artizans to provide the well apparatus.

I mention these matters to show that in considering the schemes which have been proposed, regard must be had, not only to the cost of the masonry shafts of the wells, but to other conditions essential to the existence of irrigation from wells on the scale contemplated. It is impossible to believe that in a country where the practice of irrigating from wells has existed for ages, where the people are so alive to its advantages, and where the profits of agriculture have so largely increased under the influence of peaceful rule and fixed land revenue demand, irrigation from wells would not have increased more rapidly than it has done were there not other causes than the difficulty of procuring money sufficient to construct the masonry shafts of wells to retard the increase, and in none of the proposals which have been made for extension of irrigation from wells have these causes been duly weighed. In both Mr. Prinsep's and Major Tighe's proposals the calculation has been based merely upon the amount of irrigable, not unirrigated, area, and the cost of the masonry required for wells enough to irrigate this area.

It is impossible to say how much of the slowness of the people in constructing wells is due to their appreciation of the causes which have been mentioned above, and how much to difficulty in procuring capital for constructing the wells. Some allowance must no doubt be made for the slowness of the people to understand the advantages which Government holds out to them.

The plans proposed by Mr. Prinsep and Major Tighe are both of them admirable in theory, and if they are carried out gradually the result will be profitable both to the people and to the State. What has been said above is not said in hostility to the plan, but merely to show that difficulties which have not been fully considered exist in the way of carrying out the proposals to the extent contemplated by the projectors.

The general feasibility of the proposal to extend well irrigation to a greater extent than heretofore may be tested if deputy commissioners be directed to

† Bullocks.	
16,000 × 8 =	128,000
Deduct available -	83,826
Balance -	44,174

	No.	Area.
* Mr. Prinsep	60,000	1,800,000
Major Tighe	16,000	250,000

PROTECTION FROM DROUGHT.

take up some particular portion of their districts in which irrigation may be extended with probable advantage to the people, and after explaining to the landholders the conditions on which Government makes takkavi advances, they should inquire if the people have the means to carry on irrigation from a number of new wells, and if satisfied on this point they should be directed to make advances under the rules, modified as now proposed. Much may no doubt be done by judicious encouragement, and after careful inquiry; but it must be remembered that any attempt to force advances upon the people to construct wells or any other works without some assurance that the subsidiary conditions necessary to make proper use of the improvement which it is desired to effect exist, will end in nothing but disaster. Advances will be recklessly taken and balances will accrue which it will be impossible to realize, and agricultural prosperity will be checked instead of being advanced.

The amount of available waste lands, the property of Government, in the Punjab is very large.* Much of this is considered barren, but of the amount so recorded there is a large area which requires water alone to make it fertile. Besides the Government lands there is an immense extent of culturable land included in village areas. The reclamation of lands of the latter class is going on gradually through the people themselves, who, under our system of settlement for fixed periods, enjoy the produce of all lands newly cultivated after the assessment is declared. The process of clearing such lands is going on in numberless places at once. The clearance consists in removing bushes and roots, which are valuable for fuel. No expenditure of money is required to make such clearings, and the wood which is extracted, from the ground fetches a good price. For clearing village lands, therefore, advances are not required.

Grants of Government waste land to lessees have been made to a considerable extent during late years. As the amount available is so large, it was to be expected that applicants for leases would select the lands which, from being good quality and from being situated in places where labour is readily procurable

and means of irrigation available, presented the best prospect of being profitably cultivated. Many leases of Government lands have been granted to persons possessed of capital on easy terms for fixed periods. Advances for clearing these lands have not been given, nor do the existing rules provide for advances being made for such a purpose.

Considering the immense area of village lands which is uncultivated, and the impossibility of cultivating more than a small portion of the Government wastes without canal irrigation, it is undesirable to make large grants of Government waste lands at present, and it is not necessary to give facilities for obtaining grants of takkavi for clearing such lands. If it is desired to extend cultivation in Government waste lands, a system of leases on easy terms offers quite as much encouragement as a grant of takkavi; such a lease involves no direct expenditure, and is a mode of encouraging cultivation entirely in accordance with native custom.

Mr. Prinsep has recently published a paper on the subject of constructing State canals in waste lands the property of the State.

Mr. Prinsep's proposals are not, strictly speaking, connected with the subject of takkavi advances. I may remark, however, that according to all the experience hitherto obtained in leasing waste lands it is exceedingly improbable that land will be taken up to the extent of 2,500,000 acres, at Rs. 10 per acre, if granted revenue free for ten years, even with the prospect of irrigation from canals being available. In order to bring this amount of land under cultivation, 500,000 adult cultivators will be required, or a cultivating population of at least one and a half million, exclusive of non-agriculturists. The area to be brought under cultivation is equal nearly to the whole cultivated area of the Umballa and Jullundur Divisions, and it is quite out of the question to suppose, even if the money to pay for the land were forthcoming, that a population sufficient to cultivate the whole or even one half of the land in the time proposed can be found. A far more gradual extension of irrigation and cultivation must be looked for.

If canals are made from the Sutlej, Chenab, Jhelum, and Indus, through those parts of the Doabs which are without irrigation, the Government waste lands will rise enormously in value. This is shown by the increase in the value of waste lands in the Lahore district commanded by the Bari Doab canal. The increase is so remarkable that it is very doubtful whether it is advisable to dispose of the waste lands at all until the canals are made.

* Census Report.—Statement II. Explanation Statement.

	Acres.
Culturable -	33,26,822
Barren -	60,61,277
Total -	93,88,099

Census Report.—Statement II. Column 7.
Acres 1,28,52,821.

NORTH-WEST PROVINCES AND OUDH.

The remarks which have already been made in describing the four belts into which the province has been divided (chiefly with regard to the condition of moisture above and below the soil) will have given a rough indication of the existing conditions of each portion of the province with respect to irrigation, and the following remarks will be confined chiefly to the question of future protection from drought.

Protection from drought in sub-Himalayan Belt.—The sub-Himalayan belt has been shown to be in ordinary years almost independent of irrigation, and even in years of moderate drought may be considered as thoroughly protected, but, perhaps, for this very reason it is a country which suffers more than any other in a year of extreme drought. So we find that in the Bengal famine of 1874, the only parts of this province which can be said to have suffered extremely were the sub-Himalayan tracts of the eastern districts, notably Basti and Gorakhpur; and again under the failure of rains in 1877 (which was this time greater in the west than in the east of the province) the sub-Himalayan tracts of the westerly districts were

most affected, and notably Bijnor, Moradabad, Bareilly, and Shahjahanpur.

It is easy to understand that the crops which have become the staple crops of the sub-Himalayan tracts are those which require most moisture, and that if a serious failure of rain occurs it is hopeless to attempt to supply its place by well irrigation, even supposing that the agricultural population were able to dig wells in time. But, as it is, wells are so little used in ordinary years that the inhabitants are not competent to make anything like a full use of the means of irrigation which lie below their feet. The following remarks made in the Moradabad reply illustrate this statement: "In ordinary years the narrow well, with a small earthen pot holding only about a gallon of water, suffices for the cultivator's wants, and so he does not try to improve on it, and suffers accordingly when the bad year comes."

The question at once arises what steps should be taken to oblige the agricultural population here to construct wells of such a character as would be sufficiently useful in year of drought to protect them

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against the wholesale destruction of produce to which past history shows their land to be especially subject. Wells cannot save the rice, but they can in the autumn season save a sufficient quantity of millets, pulses, and carrots to supplement to a material extent the food of the district. They can also raise fodder for cattle and save some of the sugar cane (which can be exchanged for grain), and in the spring can be made to protect a large per-centage of winter cereals.

No information has been afforded by district replies as to the area which can be protected by a single well in a year of extreme drought, but it must be the case that the area will be greatest in that part of the province where the water is nearest to the surface, and that a larger per-centage of crops could be grown with well irrigation in the sub-Himalayan tract than anywhere else in the north of India. Rice tracts are, of course, excepted; wells cannot be maintained in them, and if they could, the water volume would not be sufficient for the requirements of rice. There is, however, reason to believe that something might be done for the rice tracts by a further utilisation of the small streams issuing from the mountain range. In the words of the Bijoor settlement officer already quoted, the irrigating power of these rivers is by no means worked up to its potential limit. The Superintendent of Tarai, however, remarks that the rivers which feed his rice fields run nearly dry in the years of drought, and the only streams which are likely to be useful under pressure are those which take their rise well within the mountain range, while perfect safety is possibly only to be found in those streams which are fed from snows. It becomes a question, therefore, whether river power ought not to be concentrated more upon rice tracts than is now the case, so that if the remaining area should be sufficiently protected by wells and well-gear of efficient character, as much rice may be saved as possible by canal irrigation. It seems, indeed, wrong in principle to run canals throughout a tract of country which requires so little water in ordinary years, and it seems equally wrong not to protect by wells a country which can be so easily protected by them. These questions appear to require thorough investigation and decided action, for while there is no doubt that the sub-Himalayan belt seriously requires protection, there is also no doubt that protection can be provided at a comparatively small outlay.

Protection from drought in the Rohilkhand and Ganges-Gogra tract.—The Rohilkhand and Ganges-Gogra belt is one in which the cultivating population acknowledge the need of irrigation by extensive use of wells, and by the utilization of river water which in ordinary years is largely available. In the eastern districts of the belt, tanks largely supplement these two sources of supply. The same elements of failure, however, which exist in the sub-Himalayan belt exist in this belt also, though somewhat in a different form, that is to say, the means of irrigation employed in an ordinary year fail to a serious extent in a year of drought. The supply of water in the rivers becomes scanty and is drained by the villages lying nearest their source, so that the larger number of villages lose their supply altogether. Their wells are, to use the words of the settlement officer of Shahjahanpur, "simple and primitive arrangements, usually full in "every rains, and are seldom spring wells." There is, moreover, much lowlying land in the broad river valley already described in which the lever well is the only one employed (*i.e.*, "the well in which a small "earthen pot is attached by a rope to the long end of "a lever, weighted at the other end by a lump of mud,"), and such wells supply a very small quantity of water. Masonry wells are practically unknown in Shahjahanpur and in some other districts in the same belt; and although it is true that the eastern districts have done more to protect themselves than the western districts by the construction of masonry wells, yet, except in Azamgarh and Jaunpur, the number is not large, and even in those districts much greater dependence is placed on tanks than on good wells. While,

therefore, almost the whole of the area of the belt under notice may be described as irrigable or even irrigated, yet the real protection afforded by irrigation is very small. The first question which arises is whether a canal or canals should be run through the belt. The Sardah canal was intended for the upper portion of it, but was vetoed both by the officers who had the most intimate acquaintance with the districts concerned and by the landowners in Oudh. There is, indeed, the same objection to a large system of canals here as in the sub-Himalayan belt,—that water is not wanted in ordinary years, and is also sufficiently near the surface to make a well system practicable except for rice tracts, while the introduction of a network of canals would raise the water level, already, perhaps, too high for the health of the inhabitants, to an unhealthy proximity to the surface.

On the other hand the rice area is so large, and supplies so great a proportion of the food of this belt, that it becomes a question whether some means cannot be contrived for supplying them with water in rainy seasons without attempting to carry canals along the higher land. As far as can be ascertained there are in the North-Western Provinces tracts of this belt over two million acres of rice land, and there are probably not very much less than two millions more in the Oudh section.

The protection which is required for the belt under notice is therefore of two kinds,—the extension of good masonry wells on the upper tracts, and the artificial irrigation by canals of rice tracts. There is no doubt that measures ought to be taken at once for well extension, and that the problem ought to be attacked of obtaining a command of water for the most extensive rice areas in seasons when there is a failure of rain. The most promising remedy is probably a scheme of inundation canals which are essentially suited to the irrigation of lowlying lands over which water can be carried at minimum expense, and schemes have already been sketched in some localities under which river water could without any extravagant cost be concentrated on rice lands.

Protection from Drought in the Doab Belt.—The third or Doab tract must be considered in its two sections separately, namely, (1), the north-west section irrigated by canals; (2), the south-east section not irrigated by canals.

A review by the Secretary to the Board of Revenue of the circumstances of the Meerut district as they existed at the time of settlement about ten years ago, presents a typical picture of the change effected in a Doab district by canals, and is quoted at the end of this paper, and should be read in connection with the following remarks.

The necessity for artificial irrigation in the Doab tract is more marked than in either of the two first described, the fact being that irrigation is a desideratum even in ordinary years for the majority of winter crops. Wells of durable character are usually constructed by cultivators of industrial character, such as the Jats and Kurmis, and temporary wells are numerous in all tracts where they can be easily dug; as elsewhere remarked, however, it is unfortunate that highland canals were obliged to coincide with the best well tracts which always are found in the water-sheds. This is noticed by almost every settlement officer who has worked in the Doab, and I quote the following remarks by Mr. Crosthwaite (writing of Etāwah) in order to illustrate this statement, which is further corroborated by the review on the Meerut district quoted below. Mr. Crosthwaite, in noticing the projected extension of the Lower Ganges canal, writes:

"The line of the canal will pass through one of the most fertile and best watered tracts, as a rule, in the whole district. No benefit that it is likely to confer will compensate the villages through which it will pass for the loss of their good land, the damage to their wells, and the inconvenience and stoppage of communications caused by a large canal.

"Leaving this tract and going into the body of the

pargana which will be irrigated from distributaries, the country changes in character. There is a very large area of usar,—nearly 37 per cent. of the total area,—scattered over the pargana. This soil is at present of a dark scabby character, called in the local dialect, *papur*. The cultivation is partially scattered in the usar plains, but the mass of it is found in compact continuous blocks more or less extensive in area, separated by tracts of usar from each other. Now these blocks of cultivation are the only parts that it would be feasible to irrigate, and they are exactly those parts which are most amply supplied with water.

"The wells as a general rule are excellent and numerous. In fact, except in a few villages, all the good compact land is irrigable; water is seldom more than 24 feet, and over a great part of the country is not more than 18 feet, from the surface. The supply of water is ample, 55 per cent. of the cultivated area being irrigable from wells and 14 from other sources. In 1868-69 the wells did not fail, and the country did not suffer from the drought."

Mr. McConaghey, Settlement Officer of Mainpuri, notices in his report on that district that "over the central portion of the district" (the same portion already described on page 12 as a tract of such wonderful fertility) "the canal has raised the water "level considerably, and has affected the durability "of kucha wells near its channels most materially. "By the sandy strata nearer the surface being "saturated, it is now impossible in many instances "to sink a common kutchā well down to the real "spring below the layer of clay where formerly there "was no difficulty."

This observation shows that not only have canals occupied what were already the best protected tracts, but have also destroyed in them the ordinary means of irrigation, so that water cannot be carried by canals to the poor outlying country near the rivers without being obliged to irrigate the land formerly covered by wells. This is distinctly borne out by the lowness of indirect revenue credited to the canals in these provinces, which is only assessed upon land not previously irrigated. The total credit to the end of March 1877 was less than 10 lakhs of rupees. On the other hand, well irrigation is, with water at the depth at which it lies in the Doab belt (namely, from 20 to 30 feet, and in some parts from 30 to 40 feet), so much more expensive and difficult than canal irrigation, that the substitution of the latter affords a much more complete protection.

There seems to be a strong necessity for extending water-courses from the main canal branches to the poorer tracts not sufficiently protected by wells, and which have not yet received canal water. Reference may be made to the last paragraph of the quoted review of the Meerut settlement which affords an excellent illustration of this point. Mr. Crosthwaite's description of the central fertile tract of Mainpuri, which, although not requiring canal water, has received it because lying on the water-shed, has already been quoted. But one of the three tracts into which the settlement officer has divided the district (namely, that which lies to the north,) skirts the river Kali Nadi (a feeder of the Ganges), with respect to which Mr. Crosthwaite uses the following words: "The characteristics of this tract are preponderance of sand in the soil, *scantiness in irrigation*, and great susceptibility to fluctuations of "season." The same conditions occur in Farukhabad, where the canal irrigates the whole of the well protected loam tracts on the water shed, but only a limited per-centage of the dry villages lying along the sandy belt above the River Isan, another Ganges feeder.

[The proposal to carry irrigation to poor sandy villages does not clash with the argument that it is desirable to irrigate the best land rather than the worst land, since the term "best land" thus used means "that portion of a village which can be manured and grow good crops," *i.e.*, that portion

which can pay the highest price for its water. This explanation is given because a misunderstanding has often been found to exist on the subject.]

As, however, there are whole tracts thus unprotected in the centre of a canal system, so, too, there are unprotected villages in the centre of a fully irrigated pargana, and the cultivators of which are as much distressed in a year of drought as if they were surrounded by a cordon of villages equally dry. It must not therefore be hastily decided that the upper section of the Doab is sufficiently protected because its map is covered by a labyrinth of canals. Those villages that require water most get least. To offer yet another illustration, the following words of another settlement officer may be quoted. Mr. Smith writes of the Aligarh district:—

"In the Atrauli tahsil another canal will be seen traced on the map. It represents a projected continuation of the Fatehgarh branch of the Ganges canal, and its course was laid down many years ago and the necessary land taken up, but nothing more has yet been accomplished. The line runs between the Ken and the Ganges, and of all tracts in the country round about there is none which so urgently need water. My description of the district has shown that this is a sandy tract, where temporary or kucha wells are impracticable, and where water lies at from 40 to 60 feet below the surface. It is to be regretted that it has been found either impossible or inexpedient to carry out the project, while in other parts of the district water has been given liberally either where it is not needed at all, or where it is far less needed than here. The Lower Ganges canal, which starts from Narora in Bulandshahr, and which in Aligarh will pass along the khādir of the Ganges, will of course not affect the upper lands, and, as far as this district is concerned, will only traverse a country where the soil is already, perhaps, too moist."

It is fair to this (the Lower Ganges) canal to explain that it was intended to pass through good tracts to bad ones; but Mr. Smith's remarks explain distinctly the unfortunate necessity which exists in the Doab of laying down the principal lines in country which least requires canal water.

The reason why wells are numerous in the centre and scarce in the border of the strips of land lying between the river feeders of the Ganges and Jumna has been partially explained by previous remarks. The centre, which is usually slightly depressed, is full of loam deposit, and the soil in which the wells are dug is stiffer than on the slopes to the rivers, while underneath the surface water is drained away slowly from the central tract and quickly from the marginal tract, a circumstance which renders the disturbance of sub-soils much more severe in the marginal than in the central sub-strata, and the consequence is either that wells cannot be dug at all, or that when dug they are more and more unstable as the rivers are approached.

The facts which have been brought forward indicate clearly the desirability of extending the existing canal system to the marginal tracts which so much need irrigation, and in which, on account of the large per-centage of poor soil, the annual out-turn is at present subject to so much uncertainty.

There are at the same time certain areas into which it is probable that canal water will never come, and in which measures must be taken for constructing durable wells. The tracts noticed in Meerut by Mr. Forbes are of such a character, and similar cases have lately been brought forward by other officers, and steps ought to be taken to ensure the protection of these areas. It has been noticed that three fourths of the Upper Doab is still unirrigated by canal, and it is clear from the preceding remarks that it includes much land which sorely needs irrigation.

Crossing now to the Lower Doab, which comprises part of the Cawnpore, Fatehpur, and Allahabad districts, the extension of the Ganges canal was refused partly on the grounds brought forward in this note. The irrigation statistics of these districts

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are misleading, because they include a very large area of land which does not belong to the belt now under discussion, and which is practically unirrigated, belonging as it does to the South Jumna belt. The irrigation of the Doab belt portion of the districts is, except near the Ganges and its feeders, very much like that described in the central portion of the Mainpuri district, and (it is believed) can be made practically sufficient for protection. There is no doubt that great variation occurs in the substrata, and that masonry wells are needed in the greater part of the area to ensure permanent irrigation, but there appears to be no reason why the experiment should not be tried in this part of the Doab (which is so distant from the head of the canal) of ensuring what protection wells can be made to afford. Measures, which will be described further on, have already been taken to attack the problem. It is understood from the reports of the settlement officers who were engaged in the district of the Lower Doab that wells are feasible in nearly the whole of the area, and it is contemplated to ascertain by actual experiment whether such is the case.

The banks of the Ganges are difficult to irrigate from wells, but the strip of unirrigable land which lies along its border is so narrow that its need for irrigation would not justify canals. Here, as in the Jumna land, water is from 50 to 80 feet from the surface, and the question has been raised whether the river water could not be lifted by machinery to irrigate the cultivated area in the vicinity.

Protection from drought in the South Jumna Belt.

—The last tract to be considered is the South Jumna belt. Of this it may be at once stated that the more canals that can be brought into it the better. Water is not only far from the surface, but is in many parts of the country of a saline character. The need of canal irrigation in this portion of the province has of late years been fully acknowledged, and the Lower Ganges canal is now carried along the north edge of the Jumna ravines through the Mainpuri, Etāwah, and Cawnpore districts, the Jumna canal through the south of the Muttra and Agra districts, while the Betwa and Ken projects will irrigate a considerable portion of the Jalaun and Banda districts. What more can be done can only be decided in the Irrigation Department, but the problem is one which ought to be placed before them to investigate. There seems *prima facie* reason to believe that an extension of the Ganges canal system may be carried into the north Jumna strip of the Muttra and Agra districts, but it is doubtful whether there is sufficient water in the Betwa and Ken (rivers not fed from the snows) to supply effectively more than a limited area in the Bundelkhand country, or whether the Ganges system can be made to extend further along the North Jumna bank of the Cawnpore, Fatehpur, and Allahabad strips. All that can be said now is that if canals cannot be brought there, wells are comparatively useless.

It may not be out of place to advert here to another suggestion which has (I believe) been brought to the notice of the Forest Department, with respect to the ravine land skirting the Jumna, to the effect that this land can be made most serviceable to the country by being utilised for forest and pasturage. It would be easily enclosed by a continuous fence, and the measure would save Government from the anxiety and expense of watching over the safety and lives of the scanty population who are now continually driven, even under moderate failure of rain, to the greatest distress. How far such a proposition could be carried out without interfering with the cultivation of the fertile patches which occur in the valleys of the ravines and on the edge of the Jumna, and what the cost of the project would be, are questions which, without inquiry into it, would be impossible to answer; but the need which the Doab has of pasturage and forest makes the question one well worthy of investigation.

The extreme south of the Bundelkhand districts

obtains some (but not a great deal) irrigation from the lakes which have been dammed up in the low hills. Unfortunately, their power to protect under a drought has been proved to be very small, and even in the present year their level of water in some is below that of the water-gate.

Extracts from Review by Board of Revenue on Meerut Settlement Report.

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" 24. *Irrigation*.—Before the introduction of the canal, the irrigation of the district naturally coincided very much with the character of the soils. In good stiff clay or loam earthen wells were good and lasting, but where the soil was sandy and shifting, such wells were either more or less unstable or quite impracticable.

" 25. In some of these latter tracts, and especially in the Jat villages above the Jumna and Hindan, masonry wells have been extensively constructed, and there are about 600 pukka wells in each of the parganas of Loni and Baghpat, in which the level plain of the Hindan-Jumna Doab begins to slope towards the river, and in which, therefore, the upper strata are disintegrated and rendered unstable by the action of drainage.

" 26. The best well tract seems indubitably to have been the level portion of the Hindan-Jumna Doab, but the country between the Hindan and Kali Nadi, except on the river banks, was also favourable for wells.

" 27. The general conclusion which may be formed from the pargana reports is that wells could be dug with greater facility and of a more lasting character in proportion to their distance from drainage lines of magnitude. The best well tracts were on the water-sheds. When, therefore, canals were introduced in the only direction in which canals can be made serviceable for purposes of irrigation, i.e., along the water-sheds of the district, it was a natural consequence that they should traverse those tracts which were most fully irrigated by wells, and avoid those in which the loose and broken condition of the surface formed almost as great an impediment to irrigation channels as to wells.

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" 31. It is certain that the introduction of canal irrigation has given a great impulse to cultivation and production in the district. Mr. Porter remarks in Kithore on the improvement effected by it in sugar cultivation, and Mr. Forbes attributes the improvement of the agricultural condition of the Gujur tracts on the Loni slope to the civilizing effect of the canal. He notices, too, a remarkable instance of its influence in the pargana of Barnawa, where in the dry year of 1869 he found the cultivators of the north section, from which canals are excluded, selling their sugar mills to the cultivators of the south section, which is plentifully watered by canals. This fact speaks for itself.

" 32. It is no doubt greatly in favour of the immediate success of a canal that it should enter into a thickly populated country, where a large supply of manure may cope with the exhausting powers of a practically unlimited water supply, and where there is sufficient labour available for its utilization. The density of the population in the best parts of the Meerut district is large. In Baraut the number of inhabitants per cultivated square mile is no less than 944, and in such tracts, heavily manured as they must be, it is almost impossible that too much water can be given. Where, on the other hand, the population is more scanty, the improved facility of irrigation will admit of its gradual increase, but meanwhile it is possible that an excessive supply of water may cause the temporary exhaustion of the irrigated area.

" 33. There is no doubt that there has been an extensive increase in the irrigated area since last settlement, which is said to have increased from 232,949 to 578,512 acres, and though (as Mr. A.

Colvin remarks in his memorandum on settlement in the North-Western Provinces) these figures must be received with caution, yet the fact of a very large increase in the irrigated area cannot be doubted. The increase in cultivation is also due in some measure to the same cause. The western canal had not been long opened when Sir H. Elliot remarked that already it had caused all the waste in the neighbourhood to be reclaimed, and the same influence may be attributed to the extension of canal irrigation on other parts of the district.

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" 35. Amid all the improvements acknowledged to have been wrought by the canal one charge has been brought against it of a serious character, to which reference has already been made. Mr. Forbes complains in Chaprauli that the uncertainty of the water supply is so great an evil that he cannot but regret the substitution of canals for wells. In Baghpat he is inclined to think irrigation is excessive, and if that is the case, it seems a pity that the water supply should not be kept within more confined but less uncertain limits.

" 36. Another complaint made by Mr. Porter in Sardhana is that individual villages have suffered in consequence of the vicinity of the canal, which, while throwing down their wells by raising the water level, has not compensated them with a supply of water equal to that which they have lost.

" 37. Some allusions are also made to the obstruction caused by canal watercourses to the natural drainage of the country.

" 38. It is satisfactory to find that the evils of which complaints are made are of such a nature that it lies within the power of Government either greatly to alleviate or entirely to remove them. Steps have already been taken to provide against the obstruction to drainage in some parts of the district, and Rs. 2,000 were granted at the commencement of the present year (1873) for drainage cut in the Chaprauli pargana.

" 39. A very small portion of the district is now insufficiently watered. The cliff above the rivers and the tract of undulating sand above the Ganges are, however, scantily irrigated, and as the soil in such tracts is of the poorest description, cultivation is very precarious and distress in dry years very great. Mr. Forbes anxiously calls attention to this subject. It is questionable, indeed, whether the indiscriminate introduction of canal irrigation, even if it were feasible, would at once raise the character of such tracts. To flood a poor unpopulated tract with a sudden flush of water is more likely to exhaust its already sterile soil than to increase its productive powers. But a gradual extension of irrigation cannot fail to be of the greatest benefit even to the poorest soil, and there is little doubt that Mr. Forbes suggestion of takāvi advances for the construction of pukka wells in Garh ukhtesar may be plied with advantage both in this and other districts to all the sandy tracts along the bank of the Ganges which lie beyond easy reach of the canal. It appears desirable that the subject of takāvi advances in such tracts should be

taken into active consideration, unless, indeed, it is contemplated to introduce canals. But Mr. Forbes represents on behalf of the cultivators in some parts of the Hapur and Jalalabad parganas and other tracts now cut off from the canal that they should be told once for all what is the prospect of their being supplied with canal water, in order that they may know whether or not to sink capital in the construction of wells, which, in their present state of uncertainty, they cannot venture to do.

EXPLANATION OF STATEMENT I.

In Statement I. is shown, for each district of the North-Western Provinces and Oudh, the area of cultivated land estimated as irrigable from canals, wells, or other sources, as well as the area estimated as actually irrigated.

The irrigable area refers to the measured area which can, with existing means of irrigation, be irrigated one year with another, while the irrigated area refers to the crop area of one normal year, which area is swelled by the inclusion of second crops where such are grown. Hence, in some cases, the irrigable area will not appear so much in excess of the area actually irrigated as might be expected, since a certain amount of land is included twice over in calculating the latter.

Example.—Suppose that the area ordinarily cultivated in one year is found to be 800,000 acres. In 1876, 400,000 were under autumn crops, and 430,000 under spring crops,—total, 830,000; 30,000, therefore, must have been under both autumn and spring crops, 800,000 being the limit of the measured cultivation. So, too, out of the 800,000 acres, 300,000 acres of land might be irrigated in one year, but the actually irrigated area of crops might be (say) 320,000 acres, or 20,000 acres in excess.

The figures given for irrigable area in the districts of the North-Western Provinces are based on district officers' replies, on statistics published by the Board of Revenue in 1872, and on the reports of settlement officers where available. For the Oudh districts the irrigable area has been calculated by adding to the area assumed as actually irrigated an amount proportionate to the difference between the two in North-Western Provinces districts of parallel circumstances.

The irrigated area has been calculated for the North-Western Provinces districts from the crop statements for 1876–77 filed by patwaris (village accountants), from district officers' replies, and, where possible, from any recent settlement report. For the Oudh districts the irrigated area has been calculated from the replies of district officers and the figures given in the Oudh Revenue Administration Report for 1875–76.

For the area of canal irrigation, figures have been abstracted from the Irrigation Report for 1876–77.

Under well irrigation is included all irrigation from wells of whatever kind, whether earthen or masonry, percolation or spring.

In "other sources" are included tanks, natural and artificial jhils or lakes, ponds, and rivers.

SUPPLEMENTARY ANSWER TO QUESTION 4.

It should be explained here that irrigation as ordinarily practised is for the most part confined to the fields in which the rabi or winter crop is sown, and to garden cultivation. Speaking broadly, nearly all the wheat and about half the barley is irrigated, as well as sugar-cane, opium, and garden crops. A reference to the crop statement in the answer to Question 3, will show that the area of the different kinds of irrigated produce may very roughly be stated as follows:—

	Acre.
Wheat - - -	9,000,000
Barley - - -	700,000
Sugar-cane - -	820,000
Garden crops and opium -	500,000
Total - - -	11,000,000

In the rainy season the wells are almost entirely idle; the cattle are busy in ploughing and preparing the soil for the rabi, and are seldom set to irrigate, unless a prolonged break in the rains occur, and it is

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necessary to water some valuable crop which would otherwise perish. In the cold weather the bullocks are incessantly employed in irrigating the rabi crops. But as the general custom is, where the land admits of it, to sow rabi and kharif in rotation, a well which irrigates five acres of rabi in one year will irrigate a different five acres of rabi in another year; the whole 10 acres are, therefore, returned as irrigable. Thus, as far as wells are concerned, the irrigable area is nearly double the area irrigated in any one year, not quite double, because some of the land is under garden crops, &c., and is irrigated every year. With canal irrigation the case is different. The water-supply being abundant, and available without diverting the oxen from their labour at the plough, is largely used during the monsoon; crops are grown by the help of it which require a more regular supply of water than the precarious rain-fall; but still the rabi area irrigated by canals is always larger than the kharif area. Lastly, irrigation from ponds and streams is mainly given to such crops as grow in depressions and valleys, because the water lies in depressions and cannot be lifted far. These are either rice in the kharif, or else rabi crops; but the irrigable area in this case is the same as the area ordinarily irrigated, since rotation of crops is seldom possible in such lands. It follows from this that a well irrigated area of 5,800,000 acres indicates an irrigable area of about 10 million acres; that is to say, the wells which in a given year actually supply water to 5,800,000 acres will in the course of two years supply water to the crops that want it, which are broadly speaking, the rabi crops on 10 million acres. Similarly, canal irrigation of 1,100,000 acres will indicate that about 1,500,000 usually get water from the canal for the rabi crops that require it; but the irrigation in an ordinary year of 4 million acres from ponds and streams indicates that only 4 million acres of land can be irrigated in this way. Thus it will be understood that an irrigated area of 10,900,000 acres in the North-Western Provinces implies that about 16 million acres of land are so situate as to be capable of irrigation, though they could not all be irrigated in one year, because of the limited working capacity of the cattle, and because the crops sown on the excess 5 million acres are not such as ordinarily to require water.

2. Mr. Buck's statement shows that in the North-Western Provinces (excluding Kumaun and Garhwál and the hill tract of Dehra Dun), out of a total cultivated area of 25,344,000 acres and a total cropped area of 27,109,000 acres, there were in 1876-77—

Canal-irrigated - 1,148,000 acres, or 4·5 per cent.
Well-irrigated - 4,480,000 „ 17·7 „
Irrigated from } 1,985,000 „ 7·8 „
other sources - }

Total - 7,613,000 acres, or 30 per cent.

In Oudh, with 8,299,000 cultivated acres and 9,057,000 cropped acres, there were—

Well-irrigated - 1,314,000 acres, or 15·8 per cent.
Irrigated from } 1,982,000 „ 23·9 „
other sources - }

Total - 3,296,000 acres, or 39·7 per cent.

The degree of protection offered by these different sources of water supply is however widely different. The greatest security of all is provided by the canals, which may almost be said to afford perfect immunity against drought to the lands they water, except in the case of an extraordinary season like that of 1877, when the atmosphere was as dry in July, August, and September as it is usually in May, and a hot west wind blew which shrivelled up the plants, even while water was being poured on to their roots. The canal irrigation, however, is limited in its area, being almost entirely confined to the districts of the Doab. The only exceptions are the small canals in Rohilkhand and the Agra canal which waters the trans-Jumna parts of Agra and Muttra, but which as yet has by no means reached its full expansion. The same may be said of all canals in season of drought; the area irrigated in 1877-78 having exceeded that of 1876-77, and having been in its turn surpassed by the season of 1878-79*—

Canal-irrigated area, 1876-77 - 1,148,000
Average of 10 years, 1868-78 - 1,155,873
Area irrigated in 1877-78 - 1,412,460
Ditto 1878-79 - 1,694,000

On the other hand, the least secure of all means of irrigation is that from ponds and tanks and small streams. These dry up generally in the hot weather, and if they are not replenished by the monsoon, would be of no avail for irrigation in the ensuing season. Their beds, however, would generally retain some moisture, and would be culturable on such an occasion.

3. The area of the different belts into which Mr. Buck has divided the province for the purpose of depicting its agricultural condition cannot be precisely given; but the following figures of the main divisions of the country show approximately what proportion of the cultivated land in each is protected by irrigation.†

Name of Tract.	Total Cultivated Area.	Total Irrigated Area.	Per cent. on Cultivated Area.	Irrigated Area, deducting that from Ponds and Streams.	Per cent. on Cultivated Area.	Population.	Minimum Food-Consumption of Population at 4½ maunds per head.	Irrigated Area required to produce that Food-supply.
Doab - -	9,218,000	3,524,000	38·2	3,212,000	34·8	11,011,000	49,550,000	4,130,000
Rohilkhand - -	4,420,000	846,000	19·1	572,000	12·9	5,436,000	24,460,000	2,040,000
Oudh - -	8,299,000	3,296,000	39·7	1,314,000	15·8	11,200,000	50,400,000	4,200,000
Eastern Tract - -	7,541,000	2,925,000	38·8	1,597,000	21·2	9,671,000	43,520,000	3,630,000
Trans-Jumna - -	4,092,000	297,000	7·2	242,000	6·	3,802,000	17,110,000	1,420,000
Total - -	33,570,000	10,888,000	32·1	6,937,000	20·7	41,120,000	185,040,000	15,420,000

There is probably no part of India which is so efficiently protected from the calamity of drought as the Doab; and this is partly due to the great sums laid out by Government on the Ganges and Jumna canals, partly to the solidity of the sub-soil, which makes it comparatively easy to sink wells. Moreover, the opening of the Lower Ganges canal will soon and largely increase the area thus protected.

Rohilkhand has a moist soil, as has been already described, but it is poorly off for wells in comparison with the Doab. Oudh is better provided than Rohilkhand with wells, and indeed, if irrigation from ponds and streams is included, it stands ahead of all these territorial divisions; but they are a precarious source of supply. The eastern part of the North-Western Provinces is not only better protected than Oudh by

the number of its wells, but also has a more secure climate, the failure of the rain being an event almost unknown there, so that the irrigation from ponds and streams is less uncertain than elsewhere. But the country which is by far the worst off is the trans-Jumna tract, where irrigation covers only 7 per cent. of the cultivated area, while even of that the greater part is due to the Agra canal; and in the districts of Bundelkhand proper the proportion of area irrigated is less than 3 per cent. of the whole. A difficulty, however, arises here which exists in no other parts of the North-Western Provinces; and that is that the black soil of Bundelkhand does not in ordinary seasons require irrigation for any but garden crops; it is singularly retentive of moisture, and if the rainy season is normal, and the rains do not cease too early, the winter crop of cereals stand in no need of artificial irrigation. If, however, the rains are too scanty, or cease so early that the soil dries up before sowing time, it becomes hard and cracks, and cannot be cultivated. In such cases irrigation would be useful; but these calamities are too exceptional for any measures meant to remedy them to be financially remunerative; and as the habit of watering the land does not exist, the people would hardly know how to use water if it was supplied to them in years of drought. It is believed, however, that if canals can be made from the Betwa and Ken rivers, and if the supply of water in those streams, aided by artificial reservoirs, is found sufficient, the custom of irrigating the crops and of preparing the land for irrigation will gradually grow up, and there will be a large extension of manured and highly cultivated garden land which does confessedly need the application of water.

4. Before concluding, some remarks are required concerning the using of the term "protection from drought." In Colonel Baird Smith's Famine Report of 1861 a tract is said to be protected in which a third of the cultivated area can be irrigated in any year; and the term is used in this sense by canal engineers in general. It does not, however, seem to be a correct use. A country can only be said to be protected from famine if it can always produce enough food to support its population. If in any country ordinarily in good years an irrigated acre produces three times as much food as the population dependent on that acre require, then that country is protected from drought if a third of its cultivated area can always rely on an artificial supply of water. But it has been shown in the answer to Question 3 that in the North-Western Provinces and Oudh the cultivated area only produces 20 per cent. more food than its population require in an ordinary year, so that it would be necessary for 80 per cent. of that cultivated area to be supplied with water in order to make its inhabitants independent of the seasonal rains. Even allowing that the people would cut down their food consumption in time of famine from 5½ maunds a year to a minimum of 1 lb. a day, or 4½ maunds a year, the food requirements would still be 62 per cent. of the ordinary out-turn; and if, again, we admit that in however severe a drought some rain will fall, and some crops be saved by it and by the sowing in moist low-lying lands, still about 50 per cent. of the ordinary harvest would have to be raised (in the worst conceivable case) by artificial means; and therefore, in order that the country should be "protected from drought," it is necessary that at least 50 per cent. of it should be irrigable in any one season. Clearly it cannot be asserted of any part of the North-Western Provinces or Oudh that it enjoys such complete protection as this. And even if such an extension of irrigation as this could be obtained, which seems hardly feasible, inasmuch as it implies the raising of the securely irrigated area from 7 to 15½ million acres, it would not be possible to secure that each village should be separately supplied with water enough for half its cultivation. There would be still tracts of absolute desert surrounded by belts of fertility; and the prevention of famine would still depend, as it does

now, on the power of the inhabitants of those desert tracts to purchase food from those who possess it.

5. There is, however, another way of considering the question. Speaking broadly, an irrigated acre (if properly cultivated and manured) produces almost twice as much as an unirrigated acre; and thus the average produce per acre having been found to be 10 maunds, the irrigated acre will produce about 13 maunds and the dry acre 7. Now for the minimum food consumption of the population of North-Western Provinces and Oudh 185 millions of maunds are required; and this, on the above hypothesis, can be grown on 15 million irrigated acres. But allowance must be made, as before, for some crop being always raised on low-lying lands, in beds of streams, valleys, &c. (the area of which may be calculated at 2 million acres, raising at 7 maunds per acre 14 million maunds), and for some rain crop being harvested even in the worst season—say 14 or 16 millions more. The balance, or 160 millions, has to be raised on artificially irrigated land, and requires 12½ million acres. This is almost double the present securely irrigated area (excluding the "ponds and streams"), and it would require a very large extension of irrigation to effect such a result. In the Doab, however, it seems that the necessary provision will be made when the Lower Ganges canal is at work, and the whole canal system has attained its full development. The irrigated area of the Doab from canals and wells was 3,212,000 acres in 1876-77; the canal area had increased by 500,000 acres in 1878-79, and the Lower Ganges canal will probably add 600,000 acres more, so that the irrigated area will then be 4,300,000 acres, or more than the figure postulated in column 9 of the table in paragraph 3.

6. In that tract, therefore, the supply of food ought eventually to be sufficient for the inhabitants taken as a whole, though there will always be portions of it which have a deficiency and must buy from portions which have a surplus. In the rest of the province, however, not only is this consummation far from being reached, but there are no plans in existence which give any immediate prospect of its being attained.

7. Rohilkhand to be made safe from drought requires the extension of irrigation over about 1,400,000 acres; and it has been shown that there is no possibility of any large canal scheme here, and all that can be done is to utilise more effectually the small hill streams, and press on the construction of wells, which however, are of little use for the purpose of protecting the rice that is sown in 784,000 acres.

8. In Oudh about 1,700,000 acres have to be supplied with irrigation to secure the inhabitants from drought; the projected Sardah canal could irrigate about a million acres, but the fear of drought is not great enough to make the prospects of the financial success of this scheme at all encouraging.

9. In the eastern or Benares tract the deficiency is about the same as in Oudh, or 1,700,000 acres; but no canal has ever been planned there, and no severe drought has ever occurred. The trans-Jumna tract requires an additional supply of water for about 1,160,000 acres; and it is certain that, even if this could be given, it would take many years before the people would so change their agricultural habits as to utilise it.

10. Taking the province as a whole, it appears that there were, in 1876-77, 6,937,000 acres irrigated from canals and wells. To this may be added the increased canal area of 1878-79, 470,000 acres, making a total of 7,400,000 acres, which can be relied on in a year of drought to produce 96,000,000 maunds, or half the minimum food requirements of the country. There are further about four million acres of land irrigated from ponds, streams, &c., mostly low-lying and moist; at least half of this could be expected to produce, in a year of drought, a rabi crop equal to that on ordinary dry lands, or 14 million maunds. There would further be always something saved on kharif lands, even in the worst years, say 14 or 16 million maunds. Thus, even as matters now stand, the province may always

* See St., No. II.

† In this statement Dehra Dun, Kumaun, and Garhwál are omitted

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be trusted to produce about 120 million maunds, or eight months' consumption for the whole population. For the remaining four months' consumption, as well as for seed grain and cattle food, they would have to trust to food-stocks and to importations from other provinces. It is generally reckoned that the food-stocks ordinarily held in the country amount, at a minimum, to three months' supply over and above the usual inter-harvest consumption; and therefore there is little fear but that the railways, which can easily throw in 5,000 or 6,000 tons a day by combined action from Bengal, the Punjab, the Central Provinces, and Rajputana, would be able to supplement the deficiency, if the calamity is confined to the North-Western Provinces, and the adjoining provinces are able to export their surplus stock.

13/9/79.

C. A. E.

Mr. Buck.

NOTE ON WELLS by MR. E. C. BUCK.

The description of the province which has been given leads to the establishment of the important fact that a large per-centage of its area must be protected, if at all, by wells, and it becomes desirable, therefore, to place before the Famine Commission some account of the action which the North-Western Government has already taken in this direction, and also of the conditions, as far as they are at present understood, under which wells can be constructed.

The question of taking some decided steps for the encouragement of well construction was brought prominently forward early in 1877, when a circular was addressed by Government to selected officers of the revenue administration, desiring expression of opinion as to the measures which could best be adopted. Mr. Ricketts and Mr. Carmichael, members of the Board of Revenue, had already strongly urged the necessity of giving greater facilities to landowners for obtaining advances from Government for the purpose; and the question had also been raised whether, in the case of the refusal of village proprietors to construct wells (where required), either from their own funds or with funds placed in their hands by Government, it would not be the duty of the Government as supreme landlord to enforce the construction of them, and to recover the cost either by requiring the landowners to purchase the wells on reasonable terms, or by imposing a water-rate on those cultivators whose land would be irrigated. It must be understood that the proposition referred entirely to masonry wells, which only are sufficiently permanent and secure to justify Government interference.

The correspondence which resulted from the Government circular is forwarded to the Famine Commission with these replies, but is too voluminous to be inserted in this place, with the exception, however, of the final letter to the Government of India, which is quoted at the foot of this note, in order to explain what has been the action which Sir George Couper has definitely taken, as well as to bring to notice the difficulties which stand in the way of immediate progress on a large scale.

The most formidable obstacle is happily the one which can be most easily removed by the Government of India—namely, the difficulty of inducing landlords to take advances. There are a very large number of landowners and even of cultivators who would gladly construct wells if they could obtain capital on terms which, while remunerative to Government, would not hamper them as existing rules for granting advances now hamper them.

There is no room to doubt that the best machinery to employ for the construction of masonry wells is to be found in the agricultural community themselves, for three reasons. The first is that in any Government scheme of well-sinking the difficulty pointed out in Sir George Couper's letter has to be met, of ascertaining, in the case of each well, whether its construction will be useful and remunerative, and of making an inquiry controlled by an experienced officer in each individual instance before the well

can be commenced; the second, that agricultural labour as well as material for construction can be procured by landowners at a much cheaper rate than by Government; and the third, that arrangements for enhancement of rent can be much more easily settled between the landlord and tenants than by Government.

It is therefore extremely desirable that liberal permission be awarded to the local Government to make advances for well construction wherever wells are required, and that the present unworkable system of rules should be superseded in favour of a system by which the local Government can, on its own responsibility, make advances on such terms as may be found to be acceptable to the people. If this policy is adopted, an immense impetus will be given to the irrigating power in the province.

But there is more than one reason why the measure above noticed will be found of itself insufficient. In the first place there are many tracts in which wells can and ought to be constructed, and in which the landowners, from apathy or other causes, will take no measures to construct them: and in such cases it becomes the duty of the supreme landlord to protect the land and those who cultivate it. In the second place there are localities, and not a few in number, in which engineering difficulties, too great to be met by rude native contrivances employed in well-sinking, would be easily overcome by such scientific appliances as a Government department could supply; and thirdly, the object of Government in providing funds for building wells would not be gained unless it could be assured that the wells constructed were of a character which would guarantee permanent irrigation.

It is therefore necessary to adopt some extensive measures, independently of the agricultural community, in order to secure the object in view, and the question arises through what machinery those measures should be taken. It will be seen from the letter already quoted that the issues surrounding the construction of a well in a given spot are so numerous and so intricate that the knowledge necessary to decide where a well can or cannot be remuneratively made requires not only very special acquaintance with agricultural conditions, but a very great deal of local inquiry and investigation, and the need therefore for a special machinery to control the construction of wells, so far as they may be undertaken by Government, may be accepted, therefore, as beyond argument.

What, however, are the precise conditions under which Government machinery should control well construction is the problem which Sir George Couper has now required the Agricultural Department to work out, and an officer (Mr. Wright) is, during the present cold season, making, in communication with that department, a practical inquiry into the subject. This officer has been required to procure the construction of a certain number of wells, partly through the agency of zamindars and partly through Government agency, and in the meanwhile to provide all procurable statistics which may tend to provide a fuller knowledge of the economic and financial results of well construction than is now possessed. The field in which he is working is that part of the Cawnpore district which lies to the south-east of the canal system in the Doab belt. A similar inquiry is under contemplation in Oudh.

When the results of these preliminary inquiries are obtained, a scheme will be prepared for the adoption of general measures for the province, but whether these will take the form of a gradual advance from one district to another, or of simultaneous action throughout the province, has yet to be decided. It is not improbable that it may be found more economical as well as more effectual to complete one section of the country more or less thoroughly before commencing another, in order to avoid the dangers of extravagance and ineffectual work which are likely to attend sporadic measures.

However this may be, it has been practically decided by Government that complete arrangements shall be set on foot on an extensive scale for placing whatever permanent irrigation is available in the hands of the agricultural population, and the question has been raised by Sir George Couper whether it will not be necessary to organise a special machinery in connection with the Agricultural Department for the purpose.

The following are some of the leading problems which have to be solved:—

- (1.) In what localities are wells required?
- (2.) Will the landowners or tenants take an advance for their construction?
- (3.) If not, how should wells be constructed by Government?
- (4.) What will they cost?
- (5.) What will be their remunerative effect?

Irrigation wells as constructed in these provinces may be divided into two main classes—namely, spring wells and percolation wells.

Throughout the greater part of the province there is found at a varying distance from the surface a stratum of clay, below which there is a full and practically permanent supply of water, and above which there is only a precarious amount derived from the rain-fall of the year which percolates through the upper strata. For this reason wells which reach water below the clay are called "spring wells," while those which only reach water above the clay are called "percolation wells." The above rule is not invariable, and especially fails near rivers, where it appears difficult and sometimes impossible to find the lower or permanent supply of water except by going to a very much greater depth than that at which spring water is usually found. Masonry wells are almost invariably constructed so as to reach the spring, partly in order that a full supply of water may be obtained, and partly in order that a firm substratum may be reached on which the well may rest. Earthen excavation wells, on the contrary, are ordinarily made only as far as the percolation water, because if they were taken lower down percolation water would drive in their sides at any point where the soil might be at all sandy or loose.

There are exceptions where the intervening strata are sufficiently stable to admit of a well without masonry being run down to the spring. But such cases cannot be said to be common.

Earthen wells, i.e., excavations without masonry, are usually protected or lined at those places where sand strata are met with by cylinders of wood or coils of cotton stalks or some such material, which for a season or two prevents their giving way.

The following (a fair account of masonry-well irrigation in the Doab) is taken from the settlement report of the Mainpuri district by Mr. McConaghey, and illustrates not only the superiority of masonry over ordinary wells, but also the necessity for Government interference in obliging the agricultural community to build them:—

* Mr. Reid, Settlement Officer of Azamgarh, writes of that district:—

"In the higher lands of the district water is met at from 12 to 20 feet from the surface in the dry months of the year, and in the rainy season at a still higher level. But wells that depend upon lateral filtration are very soon exhausted. The beds in which permanent bottom springs are struck are clay, not unfrequently mixed with kankar. They lie below the ordinary water-level, but their distance from it varies much in different localities. In some places they are little below the water-level of the dry season; in others the people seem to be unable to bore deep enough to reach them. In some places the supply of water is so bountiful that, the bed once tapped, it is very difficult to empty the well; in others the supply is less abundant. To reach the spring-level several different deposits have probably to be dug through. If these are all beds of firm material, the well-maker's work is easy, and a well which is not protected by a masonry shaft will last nearly as long as one that is. There are, however, few such happy localities in this district. Almost invariably one or more beds

"For masonry wells the first and essential condition is that a firm layer of subsoil should exist for the cylinder to rest on without fear of its further sinking. Unless this stratum is reached the well is a failure. The true spring is always found beneath this hard soil, which is called 'mota' or 'gharra,' and which varies in thickness in different places, but is never too deep when reached to render it impossible to be pierced. Through the opening made in this layer by a spear or iron stake the spring water confined by it rushes up from below in a continuous jet. This keeps the well full even when constantly worked. In such wells it matters little what different soil strata intervene. Once the cylinder is firmly deposited on the 'mota,' it can easily defy all pressure from without.

"But what is a matter of minor importance in the case of a 'pucka' (masonry) well may be most destructive to a 'kucha' (earthen) well. What we have to consider in the latter is—

- "(1.) The existence or absence of a constant supply;
- "(2.) The facility or difficulty of getting at this supply; and
- "(3.) The means of maintaining communication with the source of the supply.

"As just observed, a masonry well is considered a failure unless the spring is reached; but in many kucha wells where the 'mota' is distant and the subsoil bad, it is impossible to keep the sides from collapsing before the spring is tapped.

"The owner of the well is therefore obliged to content himself with the supply from percolation, which is of course much less constant and abundant than from the spring. A percolation well often contains enough water to keep a pair of bullocks busy at its run; but many of them (particularly in the great northern sand tract) get exhausted so quickly, and are besides so fragile, that resort to even wells worked by hand is rendered necessary. Fortunately in this part of the country water is close enough to the surface to admit of even well irrigation.

"The masonry wells in good repair throughout the district number 7,282. Of these, 6,463, with 15,203 buckets, are in constant use. The kucha wells in working order during the years of survey were 54,895, with 62,171 buckets. The runs or laos are therefore 77,374 in all, or about one for every four acres habitually irrigated.

"If statistics, former and present, can be relied on—and we can see no reason to doubt their accuracy—there has been a considerable falling off in the number of masonry wells within the past thirty years. This decrease is not confined to tracts which have been brought within the influence of the canal, but is almost universal throughout the district.

"At last settlement, over the district as then constituted, containing an area of 1,280,923 acres, there were 11,186 'pucka' wells in use, with 27,471 laos. In 1848-49, over the same area, the wells had decreased to 9,170, and the runs to 23,590. At present, over an area of 1,086,253 acres, there are 7,282 masonry wells in good repair, 6,463 of which, with 15,203 laos, are used for irrigation.

"Irrigation has not decreased—on the contrary it has been largely extended; nevertheless, the tendency to replace 'pucka' wells, as they fall out of repair, by 'kucha' ones, or to resort to canal irrigation instead, is manifest.

"The reluctance to invest capital largely in wells is therefore an established fact; why it is so is difficult to determine.

"New masonry wells must be constructed either at the expense of the proprietors or the cultivators. The

of sand or light earth must be traversed before the spring-level is come to. Even when these sandy beds are some feet above the water-level in the dry months, the rise of the water-level during the rainy season is almost sure to affect the stability of wells; and wells that are not lined with masonry generally fail in at that period of the year."

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Qn. 4. new zamindars whom our laws have created, and who now hold so much of the land are, as a rule, disinclined to sink money in such improvements. They transfer the responsibility to cultivators, and their sole object seems to be to take as much out of the land as they can, and to spend as little on it as possible; whilst the majority of the old proprietors are unable to set aside large sums out of their incomes for such improvements.

"The cultivators on the other hand, on whose shoulders the responsibility has to a great extent been laid, had not till recently sufficient permanent interest in the land to encourage them to sink their savings in the construction of masonry wells, and they accordingly preferred the easier and less costly method. Before revenue and judicial sales were permitted, the hereditary tillers of the soil were seldom compelled to relinquish their paternal acres. Their general circumstances may have been, and undoubtedly were, worse than they are now. In seasons of drought and famine they suffered frightfully; but in seasons of plenty they had every inducement to invest their savings in improving their property and laying up a provision to meet future calamity.

"A masonry well was then, next to their land, the most valuable possession they had. It gave its return in increased produce, and could not be touched by the rapacity of the underlings of the Government."

The relation which the cost of a masonry well bears to the value of the water which it provides varies under different circumstances, and must be the subject of separate inquiry in each locality; an attempt can, however, be made to give some indication of the return which may be obtained for outlay on masonry wells in the lower Doab. It is proved that on an improved method of construction a masonry well containing two buckets (i.e., which can be worked by two pairs of bullocks at one time) can be constructed to a depth of 30 feet for Rs. 250 by professional engineers. The area which such a well will command, i.e., of which it will irrigate one-half at any one season, is at least 20 acres. It is also an ascertained fact that any land which can be occasionally manured can readily pay an increased rent of Rs. 1-8 0 an acre if provided with water. This is indeed a low enhancement. The outlay of Rs. 250 can therefore be made to bring an annual return of Rs. 30, i.e., 12 per cent. Mr. Wright's experiments, to which allusion has already been made, tend to prove that, even under professional agency, the cost of such a well may be brought down perhaps to Rs. 200, while if the construction is undertaken by the agricultural community the cost will be still less. There is therefore *prima facie* reason to believe that masonry wells of the depth indicated may be constructed on far more remunerative terms in the lower Doab than canals, and that from a financial point of view it will be in the interests of Government to make large grants for expenditure on well irrigation there.

In a well of which the masonry is sunk to 30 feet water will lie at about 20 feet, since it is essential that the masonry sides should be 10 feet below the surface of the water. It is probable that in the sub-Himalayan and Rohilkhand belts it will seldom be necessary, except in the vicinity of large rivers, to exceed 30 feet of masonry, since water seldom falls so low as 20 feet; but on the other hand irrigation in ordinary years is so easily obtainable from rivers, tanks, lakes, and earthen wells, that it is doubtful whether water has the same rental value as in the Doab. Land which would be irrigated from any masonry wells that might be constructed is already sufficiently "irrigable" in ordinary years, and pays already a rent based on this fact. This consideration will reduce the profits on outlay, but how far it will do so can only be decided by scientific inquiry, which must be made. Again in the Doab water is constantly at a greater depth than 20 feet; 30 feet is probably a safer average, and 30 feet requires masonry of 40 feet, and an outlay, under professional agency, for a two-

bucket well, of about Rs. 300. Water however, is so much required in the Doab that even at this depth an enhanced rent will be paid which gives a return of 8 or 9 per cent. on the outlay.

It must never be forgotten, in dealing with well irrigation, that in proportion to the depth from which water is lifted so is the area for which water will be taken restricted, not only because less water is raised in the same time, and therefore a smaller area irrigated in one day, but also because on account of greater labour and expense the cultivator will only consent to irrigate land of good quality or well manured. It becomes, therefore, a very important object to obtain some more effective and economical method of raising water than now exists. English pumps are too complicated and expensive for India, and a cheap simple machine must be formed which can be constructed or at least repaired by the village blacksmith. The Agricultural Department is carrying out a series of experiments with a view of obtaining a cheaper and better water-lift, and some promising results have already been obtained by a cheaply constructed hand pump adapted from an Australian pump brought out by Mr. Buck three years ago from Melbourne. The question is one, however, which deserves to be studied by the best engineering ability in the country. It seems difficult to believe that the problem cannot be solved of raising water from a depth of 20 or 30 feet at a cheaper rate than if brought two or three hundred miles from the foot of the Himalayas, and it seems equally difficult to understand why no movement has hitherto been made to direct the rich engineering talent which the country possesses towards its solution.

There is a separate but not unimportant object in providing the agricultural population with pumps worked by hand. Cattle power fails rapidly in a season of drought, and in a year of continued failure of rain may become quite unequal to afford any material protection. A system by which water could be economically raised by hand becomes at such a time far more useful to the country than one which depends on bullocks. Mr. Buck's experiments tend to show that water can be raised from a depth of 15 feet, with the pump above noticed, at half the expense of the labour now used in lifting water by baskets from tanks and ponds. Now it is proved that with three feet basket-lifts six men can irrigate one acre a day, and that one man's irrigating power is therefore one-sixth of an acre a day from three feet. This rate gives one-thirtieth of an acre for 15 feet, or one acre in 30 days. To save a crop in extreme drought one acre must possibly be watered once in 14 days, though in ordinary seasons it does not want more than one watering in six weeks.

At a rough estimate, therefore, one man's labour could save a crop on half an acre, or about 400 lb. of grain each season, or 800 lb. of grain in all. Of carrots a very much larger weight could be saved (as shown in Mr. Buck's note on carrots as a famine crop); two men could therefore probably irrigate enough land to give food to five persons, which would practically be food for the whole family.

The above statement is intended not so much to assert that the figures brought forward are proved facts as to indicate in what direction experiments are being and ought to continue to be made. It is sufficient at present to say in conclusion that there is no subject which has engaged the practical consideration of the North-Western Provinces Government more than that of well irrigation.

There are other possible means of obtaining irrigation, such as raising water from snow-fed rivers either by steam, or by scientific pumps; concentrating small streams into rice tracts in the rainy season; constructing small canals from small rivers at different points of their course, conserving rain-fall, &c., which will be studied at the same time that well construction is taken in hand, but it will be premature to assert now how far these subsidiary means of irrigation can be brought into action.

APPENDIX A.

No. 3503A., dated Camp Lucknow, the 2nd December, 1878.

From C. ROBERTSON, Esq., Secretary to Government, North-Western Provinces and Oudh, to Secretary to Government of India, Department of Revenue, Agriculture, and Commerce.

SIR,—I am directed to submit, for the information of His Excellency the Governor-General in Council, a copy of the papers noted below*, on the subject of constructing wells at the expense of the State as a protection from drought, and to communicate the following remarks.

2. The prominent features of the voluminous notes and suggestions which have been placed before his Honor on the subject appear to be a very great diversity of opinion as to the amount of pressure which it may be necessary to place upon the agricultural population to induce them to construct wells, much doubtful conjecture as to the method and cost of well construction; and almost complete ignorance both as to the extent to which wells are required and as to the localities in which they are most urgently needed.

3. There are no sufficient data to enable His Honor to place before the Government of India any approximately definite figures, either of the extent to which the public funds would be called upon, under the provisions of any Bill which might now be drawn up, to subscribe to the construction of wells, or of the financial results which would be involved either to Government or to the subordinate landlords of the country, upon whom it is practically proposed to lay the chief burden of risk and expenditure.

4. Under these circumstances His Honor cannot but hesitate to bring forward any final proposition which can be made the foundation of a measure by which the agricultural interests of the whole province must be largely affected, either for good or for evil. Experience has proved the danger of launching into any scheme, however benevolent in intention or plausible in theory, without a careful and practical investigation of the facts by which it is surrounded. It is sufficient to refer to canals—and some such there are—which ought never to have been constructed, and to defray the cost of which the agriculture wealth of the country has been drained, in order to prove the necessity of avoiding such hasty action as may lead to similar results in the general construction of wells. And His Honor fears that any hasty action taken under present circumstances for the general construction of wells would but add to the number of well-intended but unprofitable projects. In the famine of 1838-39 it was considered wise to utilise starving labour in many parts of the country for the excavation of tanks. Tanks were dug, but they have been dry ever since.

5. It is one thing to say that a well of a certain kind—costing a certain sum of money, constructed in a certain place, and utilised by a certain set of cultivators on a certain class of soil for the production of certain crops—would or could pay so much rental to the landlord and so much revenue to Government, and another thing to say that such wells can be built at the same cost in many places, and utilised to the same advantage by every class of cultivator under every diversity of condition. It seems to His Honor that not a single well should be built under pressure from Government until Government is thoroughly assured of the benefits which will result from its construction; and His Honor is completely convinced that no assurance can possibly be furnished until the

most careful study has been made of the special circumstances of the locality in which it is to be constructed.

6. The Board of Revenue have in their draft Bill proposed to give the Collector of each district authority to construct wells primarily at the cost of the Exchequer, and finally at the cost of the agricultural population, wherever and whenever they may choose to do so. His Honor need make no other reference than to the replies received to the Famine Commission queries to prove the extreme danger of such a proposition. Without entering into a discussion of the causes which have led, and will even under improved administration for some time continue to lead to such a result, the fact is absolutely certain that district officials are practically unacquainted with the agricultural circumstances of the land, and that they certainly have no time now to learn them. A long experience in the review of settlement operations and reports has, on the other hand, left no stronger impression upon the mind of His Honor than that which induces him to believe that a close and personal inspection of each locality and ascertainment of its condition is the only safe basis upon which to form any proper decision as to its agricultural requirements; and that (more than this) an intimate acquaintance with the requirements of one locality, derived though it be from personal inspection and inquiry, is no safe guide to a knowledge of the needs of another even in the same neighbourhood. Now His Honor cannot conceive any section of agricultural operations which in this country depends upon more numerous or more intricate conditions, both above the ground and under the ground, than that of well irrigation.

The depth at which water will be reached; the depth of water when reached; the abundance of the supply; the condition of strata to be penetrated or in which water lies; the character of the water itself; the cost and supply of material and labour in each locality; the size of well most adapted to the place; the nature of the soil to be irrigated; the kind of crops which can be raised; the class of cultivators by whom it will be utilised; the relations, amicable or otherwise, which they bear to each other and to their landlords; the distance which water has to be taken from the well; the extent to which irrigation is already available in the neighbourhood—every one of these questions (and His Honor cannot pretend to enumerate all that will arise) should in His Honor's opinion be made in each case the subject of special inquiry before sanction ought to be given to the construction of a single well, either at public expense or under official pressure. With this conviction His Honor must record that he is decidedly opposed to the adoption of any legislative measure which will give authority for the construction of wells, except under the most careful provisions for local inquiry by competent and special agency.

7. His Honor is inclined to proceed with even greater caution. In consideration of the large financial interests which must be concerned in any scheme for well construction (how large it is impossible now to predicate), the wisdom of issuing any definite laws or rules under which the scheme shall be worked, until the conditions by which it is surrounded and upon which it is to be framed have been to some extent ascertained, seems very doubtful. In His Honor's opinion the safest course will therefore be to commit the investigation of the circumstances of one or more tracts to a staff of specially selected officers, from whose inquiries more definite ideas may be gained, both as to the financial results which are likely to ensue, and as to the best method of executive procedure; and at the same time to entrust them with authority and funds for the construction of a limited number of wells. His Honor suggests that such preliminary action should be taken at the cost of provincial funds.

8. The views to which His Honor has given expression on the necessity of local investigation by a special staff must, if accepted as the basis of future legislation, lead to the establishment of a separate agency, whose principal duty it will be to study the

* From Secretary, Board of Revenue, North-Western Provinces, to Secretary to Government, North-Western Provinces and Oudh, No. 1827N., dated 6th September, 1878, with enclosures and accompaniments.

From ditto to ditto, No. 1828N., dated 6th September, 1878.

From Under-Secretary to Government, North-Western Provinces and Oudh, in the Public Works Department, No. 1570A-C., dated 19th October, 1878.

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agricultural circumstances of each locality in which it is proposed to construct wells, or rather whose principal duty it will be to study the agricultural circumstances of every locality not fully irrigated, in order to decide whether or not wells are there required. The question then arises whether the results which will be obtained will justify the expenditure. At present (*i.e.*, until the experimental inquiry which His Honor proposes has been carried out) the amount of expenditure cannot be accurately gauged; but His Honor conceives that local inspection could not be effected at a very much more rapid rate than local inspection for settlement purposes in any set of villages in which wells are required, in which details arrangements have to be made. Taking settlement data as a guide, His Honor doubts if, under a village to village inspection, any district could be thoroughly worked by one officer in less than two or three years (some would take more), and His Honor hesitates to estimate the expenditure which would be thus entailed. Roughly, it may be from Rs. 25,000 to Rs. 50,000 per district,—an administrative charge which would in His Honor's opinion have to be borne by the country at large in the capacity of supreme landlord, and not (as one of the items in the construction of wells) by subordinate landlords.

It would be useless to say that the expenditure can be avoided by asking district officials to do the work, even had they the knowledge and aptitude required for the duty, since, under present circumstances, they have no time whatever for local inspections of the kind contemplated.

9. If then it is decided that Government is bound, in defending the country against famine, to establish a scheme for the general construction of wells, and the argument is also accepted that no scheme can be adopted which does not involve local inspection by a special staff, it follows that a large expenditure must be incurred over and above the ordinary charges for construction.

10. In considering the important issue thus involved, the question naturally suggests itself whether such expenditure can be simultaneously utilised in any other direction. There is, on the one hand, almost universal ignorance of the agricultural circumstances of the country and its cultivators, and on the other, a special staff employed in ascertaining them for the purpose of deciding whether or not they justify the construction of wells. Are there no other questions to the elucidation of which their inquiries can be made to tend? There are of course many, and it would perhaps be more difficult to restrict than to extend their number; but what, from a financial point of view is more to the purpose, there are some duties now imperfectly performed by district officials, on account of the impossibility of their obtaining that very knowledge of local circumstances necessary to their proper performance, which could be far more perfectly acquitted by special officers studying the conditions of each separate tract. The utilisation of their services in such duties would probably enable Government, with little expense to the administration, to draft some of the existing revenue staff for the special duty of local inspection. Prominent among duties of the nature referred to is that of enhancing and determining tenants' rates, and if (as was once wisely proposed) the rental assessments of each tract were disposed of at one time in each tract for a series of years, the harassing work now thrown upon revenue officials, of deciding rates in every corner of the district in the same season, upon data of which they are in a great measure ignorant, would be swept away, and far more justice would be done to the agricultural population than is now the case. An attempt was made a few years ago to meet the difficulty by appointing from year to year a special officer in each district to undertake rent assessments, but the experiment has failed for obvious reasons, the most obvious being that it is impossible for successive officers to obtain intimate acquaintance with the local conditions sur-

rounding each case in so large an area as a whole district. The above instance has been brought forward by His Honor to prove that expenditure can be defrayed, at least in part, by throwing upon a special staff much work now imperfectly done by the general staff; but it is at the same time clear that many other results can be obtained in directions in which little work at all is now effected, but which are of great importance to the administration, such as the collection of facts relating to the debts and financial position of the cultivating community. It is, however, unnecessary to dwell further at this time upon questions which will, if the experimental trial proposed by His Honor is carried out, be the subject of more mature consideration in any final proposals which may be based upon its results, and it is sufficient to indicate that inquiries necessary for a general scheme for well construction can be profitably utilised in other directions of equal importance.

11. The proposals which His Honor now desires to make are these—

(a.) Two tracts, in which there are *prima facie* reasons for believing that wells can be constructed at a reasonable cost with advantage to the agricultural community, will be chosen in different parts of the province.

(b.) They will also be such as contain one or more villages under Government management.

(c.) A special officer will be employed in each to make a thorough examination of the country, and to decide for each village in the tract whether or not wells can be advantageously constructed.

(d.) If, as inquiry progresses, it is ascertained that wells may be advantageously made by Government agency, a sufficient engineering staff will be placed at his disposal on such terms as the local Government may consider desirable.

(e.) Takávi advances will be granted in all cases where the agricultural communities are willing to accept them.

(f.) In other cases, in which the consent of those who possess interest in the land may be obtained, wells will be constructed by Government agency, and a well rate charged on land to be irrigated from them.

(g.) In villages under Government management (no consent being required) wells will be constructed by Government agency, and a well rate charged as above.

(h.) The object of the experiment being to ascertain the best and most economical plan to be adopted, no precise rules will now be laid down as to the method to be followed in constructing wells.

(i.) The provincial department of agriculture will be required to exercise a general superintendence over operations, to consult with the local Government and with the officers employed as to the different methods which should be tested, and to review from time to time, for the information of Government, the progress which may be made or the difficulties which may arise.

(j.) *Pari passu* with other proceedings, the officers employed will, so far as they have leisure, be utilised in making special investigations into agricultural circumstances of which at present imperfect knowledge exists (such as those which are now the subject of inquiry by the Famine Commission, *e.g.*, the produce of land, the cost of irrigation, the indebtedness of cultivators, &c.): such investigations will dovetail naturally in with those which are essential for ascertaining the desirability of constructing wells.

(k.) At the conclusion of the season a report on obtained results will be required, which may be found sufficient to indicate in what direction legislation is required, as well as the probable financial results of extending the system throughout the provinces. It is, however, likely that, since few wells can be constructed in time for the irrigation of this year, a sufficient report cannot be obtained until the end of next cold weather.

12. In carrying out the above programme it does not appear necessary for His Honor to ask the Government of India for assistance, except in the

matter of extending the rules under the Takávi Act in such a way as to enable advances to be made on less troublesome terms than those which now exist. A change is so essential that, unless it is effected, His Honor fears that little result will be obtained from the proposed experiments. The changes which His Honor desires to see made, and which, it will be understood, require no fresh legislation, are contained in an appendix to this letter.

13. Pending the consideration of the whole subject of general legislation by the Government of India for enforcing the construction of wells, and of the various issues which are raised in connection with the subject, it is the intention of His Honor to lose no time in setting on foot the operations explained in the above programme. Meanwhile His Honor urgently solicits immediate orders on the question of extending the takávi rules, and suggests that if the Government of India are not prepared at present to commit themselves to any general alteration of the rules, special license be granted in the present case for offering advances on more liberal terms.

PROPOSED RULE FOR ADVANCES.

Appendix to G. O. No. 3,503A, dated 2nd December 1878.

I.—In the case of advances given for the construction of masonry wells by the officer specially deputed by the Government of the North-Western

Provinces to inquire into the necessity of providing the means of irrigation as a protection from drought, rules 19, 20, 21, 22, and 25 of the Rules for giving effect to the Land Improvement Act (XXVI. of 1871) in the North-Western Provinces and Oudh are suspended.

II.—In the district or part of a district in which such inquiry is being conducted, applications for advances for the making of masonry wells may be presented on plain paper; and all instruments executed by persons taking advances for such a purpose, or by their sureties, as security for the repayment of the same, are exempted from stamp duty.

III.—The amount advanced shall be recoverable by equal annual instalments, the first of which shall fall due one year after the completion of the well made with the advance, and the amount of which shall be determined, so that at the expiry of the current settlement of land revenue the whole of the principal, with interest at $4\frac{1}{2}$ per cent. per annum, shall have been recovered.

IV.—In lieu of other security the officer authorised to make advances may accept the hypothecation of the enhanced rents payable for the land to be irrigated from the well for which the advance is given, or of a part thereof, or may make such other arrangement as he finds advisable and is approved by the local Government, provided he is satisfied that there is reasonable security for the repayment of the advance.

STATEMENT I.—Showing IRRIGABLE AND IRRIGATED AREA.

DISTRICT.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.				
	Total Cultivated Area.	Total Cultivated Area Irrigable.	Per-centage of Irrigable Area on Total Cultivated Area.	Total Crop Area.	Total Crop Area Irrigated in the year 1876-77.								Grand Total of Irrigated Area.	Per-centage of Irrigated Area on Total Area under Crops.
					Canals.		Wells.		Others.		Total.			
					Kharif.	Rabi.	Kharif.	Rabi.	Kharif.	Rabi.	Kharif.	Rabi.		
N.B.—The figures (except in columns 3 and 10) represent thousands.														
N. W. PROVINCES.														
Meerut Division.														
Saharanpur	825	190	23	895	37	38	11	30	1	2	49	70	119	13
Muzaffarnagar	700	323	46	737	57	77	33	40	1	3	91	120	211	29
Meerut	1,050	578	55	1,150	97	144	57	91	2	6	156	241	397	33
Bulandshahr	850	420	49	918	48	77	51	116	2	5	101	198	299	32
Aligarh	950	730	70	1,050	38	65	167	297	2	5	207	367	574	55
Total Meerut Division	4,375	2,241	51	4,750	277	401	319	574	8	21	604	996	1,600	33
Rohilkhand Division.														
Bijnor	650	50	7	700	4	3	6	4	9	3	16	10	26	4
Moradabad	900	436	48	954	—	—	60	100	30	50	90	150	240	25
Bareilly	1,160	420	35	1,270	—	—	60	86	26	40	86	126	212	16
Budaun	840	200	35	890	—	—	13	95	6	45	19	140	159	18
Shahjahanpur	740	350	47	780	—	—	32	104	16	50	48	154	202	26
Tarai	130	50	38	160	2	3	—	—	1	1	3	4	7	4
Total Rohilkhand Division	4,420	1,606	36	4,754	6	6	171	389	85	189	262	584	846	17
Agra Division.														
Muttra	660	380	60	730	5	9	5	139	1	5	11	153	164	23
Agra	1,050	520	58	1,110	16	30	59	222	5	9	80	261	341	36
Mainpuri	608	450	74	648	22	61	25	167	4	21	51	249	300	47
Farakhabad	670	380	60	707	12	27	18	126	3	25	33	178	211	32
Etawah	550	360	65	615	32	74	11	49	2	5	45	128	173	30
Etah	620	350	56	660	7	14	34	143	3	9	44	166	210	31
Total Agra Division	4,158	2,440	62	4,470	94	215	152	846	18	74	264	1,135	1,399	33

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STATEMENT I.—Showing IRRIGABLE and IRRIGATED AREA—concluded.

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DISTRICT.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.				
	Total Cultivated Area.	Total Cultivated Area Irrigable.	Per-centage of Irrigable Area on Total Cultivated Area.	Total Crop Area.	Total Crop Area Irrigated in the year 1876-77.								Grand Total of Irrigated Area.	Per-centage of Irrigated Area on Total Area under Crops.
					Canals.		Wells.		Others.		Total.			
					Kharif.	Rabi.	Kharif.	Rabi.	Kharif.	Rabi.	Kharif.	Rabi.		
<i>N.B.—The figures (except in columns 3 and 10) represent thousands.</i>														
<i>Allahabad Division.</i>														
Cawnpore	850	560	56	910	41	103	54	169	15	20	110	292	402	44
Fatehpur	545	290	53	585	—	—	42	74	38	78	80	152	232	39
Banda	780	8	1	805	—	—	—	1	1	3	1	4	5	—
Allahabad	1,030	400	38	1,105	—	—	46	92	54	108	100	200	300	27
Hamirpur	750	15	2	779	—	—	—	2	1	6	1	8	9	1
Jaunpur	580	480	83	600	—	—	60	185	60	85	120	270	390	65
Total Allahabad Division	4,535	1,753	38	4,784	41	103	202	523	169	300	412	926	1,338	28
<i>Benares Division.</i>														
Azamgarh	936	660	70	1,004	—	—	40	158	52	210	92	368	460	45
Mirzapur	950	250	26	990	—	—	20	30	80	102	100	132	232	23
Benares	485	300	62	510	—	—	26	84	13	77	39	161	200	39
Gorakhpur	2,000	900	45	2,150	—	—	184	244	95	120	279	364	643	30
Basti	1,250	600	48	1,350	—	—	110	144	54	72	164	216	380	28
Ghazipur	990	640	64	1,060	—	—	96	124	101	119	197	243	440	41
Total Benares Division	6,611	3,350	44	7,064	—	—	476	784	395	700	871	1,484	2,355	33
<i>Jhansi Division.</i>														
Jalaun	580	20	3	600	—	—	—	7	3	1	3	8	11	2
Jhansi	350	25	7	360	—	—	—	19	1	2	1	21	22	7
Lalitpur	242	30	12	250	—	—	—	18	1	2	1	20	21	8
Total Jhansi Division	1,172	75	6	1,210	—	—	—	44	5	5	5	49	54	4
<i>Hill Tracts.</i>														
Dehra Dun	73	29	39	77	3	2	—	—	4	12	7	14	21	27
Kumaun	327	75	23	551	28	30	—	—	2	10	30	40	70	13
Garhwal	120	8	6	200	—	—	—	—	—	3	—	3	3	1
Total Hill Tracts	520	112	21	828	31	32	—	—	6	25	37	57	94	11
Provincial Total N. W. P.	25,791	11,577	37	27,860	449	757	1,320	3,160	686	1,314	2,455	5,231	7,686	23
<i>ODDH.</i>														
<i>Lucknow Division.</i>														
Lucknow	332	200	60	382	—	—	80	90	—	—	—	—	170	45
Bara Banki	718	500	69	788	—	—	100	300	—	—	—	—	400	51
Unao	596	400	67	648	—	—	100	200	—	—	—	—	300	46
Total Lucknow Division	1,646	1,100	66	1,818	—	—	280	590	—	—	—	—	870	48
<i>Fyzabad Division.</i>														
Fyzabad	607	400	66	655	—	—	154	196	—	—	—	—	350	54
Bahraich	801	300	38	883	—	—	21	38	—	—	—	—	59	7
Gonda	1,017	300	28	1,170	—	—	69	138	—	—	—	—	207	18
Total Fyzabad Division	2,478	1,000	40	2,708	—	—	244	372	—	—	—	—	616	23
<i>Sitapur Division.</i>														
Sitapur	917	200	22	1,011	—	—	65	85	—	—	—	—	150	14
Hardoi	863	300	34	920	—	—	100	160	—	—	—	—	260	28
Kheri	805	200	25	865	—	—	35	65	—	—	—	—	100	12
Total Sitapur Division	2,585	700	28	2,796	—	—	200	310	—	—	—	—	510	18
<i>Rae Bareli Division.</i>														
Rae Bareli	570	450	80	620	—	—	190	210	—	—	—	—	400	64
Sultanpur	572	550	96	622	—	—	220	280	—	—	—	—	500	80
Partabgarh	448	420	93	493	—	—	180	220	—	—	—	—	400	81
Total Rae Bareli Division	1,590	1,420	89	1,735	—	—	590	710	—	—	—	—	1,300	75
Provincial Total Oudh	8,299	4,220	50	9,057	—	—	1,314	1,982	—	—	—	—	3,296	36
Grand Total N. W. P. and Oudh	34,090	15,797	43	36,917	1,206	—	5,794	3,982	—	—	—	—	10,982	30

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STATEMENT No. II., showing CANAL IRRIGATION (in Acres) by DISTRICTS in the NORTH-WESTERN PROVINCES.

Districts.	1869-70.		1870-71.		1871-72.		1872-73.		1873-74.		1874-75.		1875-76.		1876-77.		1877-78.		1878-79.																
	Kharif.	Rabi.	Year.	Kharif.	Rabi.	Year.	Kharif.	Rabi.	Year.	Kharif.	Rabi.	Year.	Kharif.	Rabi.	Year.	Kharif.	Rabi.	Year.	Kharif.	Rabi.	Year.														
Salarnpur -	45,620	99,472	148,292	58,450	40,092	87,996	32,531	35,945	67,879	9,088	33,417	72,515	33,901	31,296	63,137	34,949	34,061	69,910	41,029	33,531	74,960	36,816	37,724	74,540	46,071	68,776	115,447	88,388	46,045	60,323	112,898				
Muzaffarnagar -	63,726	210,433	304,159	74,126	72,397	146,522	59,097	77,086	136,758	45,501	73,572	110,376	50,562	61,048	111,594	49,221	64,834	116,055	45,495	69,351	114,756	68,580	68,728	130,608	57,177	77,093	134,270	76,195	81,694	157,880	147,201	80,169	103,803	184,032	
Meerut -	106,904	101,237	208,161	113,038	143,558	256,994	84,968	156,127	241,125	71,866	121,827	193,603	68,407	109,084	178,481	78,084	106,231	189,315	68,276	110,802	187,578	85,129	126,042	211,771	97,015	144,101	241,116	132,215	192,728	234,943	234,943	334,874	334,874	234,072	
Bulandshahr -	45,583	110,037	155,620	64,588	69,623	153,413	42,242	70,729	121,988	35,613	59,392	94,815	39,758	61,345	106,103	60,003	66,293	116,898	68,270	117,566	137,716	45,388	77,318	124,765	87,712	77,318	134,765	85,712	66,856	127,027	152,068	152,068	197,870	197,870	234,072
Aligarh -	46,351	82,574	128,925	55,890	59,947	115,037	44,871	68,016	112,881	46,202	47,767	93,938	40,070	63,465	91,133	41,537	63,465	102,002	39,751	74,078	114,729	38,940	70,419	106,308	38,414	64,862	103,276	70,419	71,527	142,013	111,732	111,732	157,880	157,880	234,072
Muttra -	8,772	14,539	23,311	7,689	10,942	19,703	7,339	12,424	19,703	6,497	10,478	16,975	6,412	13,243	19,655	6,136	393	6,520	8	3,708	3,774	2,137	8,167	10,304	5,436	9,345	14,781	13,906	33,563	54,859	18,308	17,379	32,994	32,994	50,813
Agra -	812	1,029	1,841	587	845	1,432	525	939	1,434	590	902	1,561	589	2,169	2,758	513	13,121	13,631	7,279	22,703	29,982	29,899	8,882	17,569	26,251	6,776	13,775	20,551	14,733	15,910	30,645	28,022	9,976	37,032	47,028
Etah -	12,985	22,768	35,753	12,041	17,755	29,796	10,151	13,306	23,457	11,716	14,863	24,579	9,463	15,775	24,208	0,537	19,580	29,126	8,277	20,482	29,899	8,882	17,569	26,251	6,776	13,775	20,551	14,733	15,910	30,645	28,022	9,976	37,032	47,028	
Mainpuri -	31,961	68,554	98,315	17,810	30,123	56,833	15,000	43,101	60,010	13,696	33,501	47,997	16,542	49,171	63,713	20,112	57,087	78,090	22,613	74,487	97,100	24,783	70,784	98,567	47,601	44,318	91,919	77,433	39,711	63,556	103,307	103,307	147,201	147,201	234,072
Farrukhabad -	14,266	29,905	44,201	11,102	12,812	23,914	8,893	13,655	26,958	6,635	13,112	19,745	9,139	21,811	30,970	9,485	25,889	38,074	11,088	30,288	42,376	13,576	27,115	40,190	32,245	73,645	105,890	53,682	17,943	42,275	34,606	19,039	28,159	47,228	
Etawah -	33,683	55,108	83,191	17,218	38,492	55,710	17,200	40,666	64,866	15,106	35,565	50,671	20,890	39,316	79,706	28,875	74,185	104,296	27,246	85,448	114,576	33,782	77,417	102,190	32,245	73,645	105,890	53,682	17,943	42,275	34,606	19,039	28,159	47,228	
Cawnpore -	32,011	73,801	106,212	25,566	56,315	84,851	27,158	47,784	74,914	18,635	48,315	66,940	27,289	50,091	80,480	33,147	81,146	114,296	39,276	102,200	114,576	43,311	68,466	142,967	41,280	102,904	144,938	74,171	78,522	162,038	111,530	56,488	90,447	132,915	
Delhi, Agra -	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	37	20	46	68	4	22	26	160	190	340	340	116*	83	537	672
Canal.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	9,410	2,167	7,388	9,555	4,847	10,264	15,111	16,790	31,888	48,028	20,620*	11,528	29,447	41,275	41,275
Gurgaon, Agra -	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	15,613	6,156	12,390	5,726	6,869	12,503	4,979	7,381	12,060	12,785	8,597	9,607	13,804	13,804	18,204
Dun -	4,114	9,810	13,954	4,247	6,182	10,429	4,655	7,763	12,418	5,535	5,504	11,030	5,217	8,785	14,092	6,182	6,862	13,044	5,505	10,020	15,613	6,243	6,156	12,390	5,726	6,869	12,503	4,979	7,381	12,060	12,785	8,597	9,607	13,804	
Bijnor -	146	1,609	1,655	1,600	316	1,376	554	1,880	2,434	1,113	522	1,035	1,246	2,159	3,405	2,080	768	3,449	918	1,692	2,910	1,169	1,876	3,045	2,721	1,711	4,432	648	1,475	2,128	2,586	—	1,283	1,283	
Tarni -	3,622	4,573	8,195	2,086	1,398	4,384	2,700	1,608	4,398	1,370	708	2,078	3,405	6,514	4,362	3,128	7,455	5,921	3,552	4,901	5,921	3,552	4,901	8,433	3,655	2,637	6,992	1,795	292	2,087	5,571	1,528	5,469	5,469	
Bareilly -	29,319	29,398	63,717	31,646	9,403	41,010	25,637	26,888	51,625	19,700	17,519	37,252	10,507	29,222	43,729	29,641	30,359	69,000	7,996	17,810	28,803	8,474	41,838	50,312	33,181	68,307	21,277	6,712	27,869	46,697	20,151	53,236	73,447	73,447	
Jhansi -	—	—	34	88	122	12	111	153	8	172	189	21	420	411	59	500	569	50	717	767	45	408	453	28	254	282	29	445	474	474	867	85	866	671	
Hamirpur -	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1,383	199	1,271	1,450	225	457	682	590	757	1,017	1,089	105	1,026	1,129	1,129
Total	483,238	912,467	1,425,702	501,625	588,048	1,080,573	398,112	633,293	1,031,355	233,117	510,372	852,199	353,619	586,958	940,577	401,576	647,736	1,019,312	389,706	752,872	1,142,278	429,784	788,408	1,188,187	463,450	776,333	1,299,583	731,883	728,843	1,461,428	1,155,873	960,026	1,075,952	1,785,078	1,785,078

† For four years only.
‡ For nine years.

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BENGAL.

Mr. Toynbee.

The only figures available for this province, to show the area commanded by wells, tanks, and other private sources of irrigation, are those given in the Return XLIB, referred to in the answer to Question 3. In the absence of regular detailed survey, these figures, as obtained from local officers, cannot be regarded even as a very remote approximation to the truth. In fact they are mere guess-work. However, as such sources of irrigation are dependent more or less on the rain-fall of the particular locality where they exist, they can hardly be looked upon as preventive measures in themselves, at any rate as regards the rice crops on which alone depends the question of general famine in Bengal. In Behar, where well irrigation exists for the more valuable dry weather crops, such as sugar-cane, poppy, &c., the area covered by wells may be estimated at 600,000 acres in round numbers.

As regards State irrigation, there are three projects in partial working order, the works on which are still in progress. They are the Orissa, the Midnapore, and the Behar Canals, or series of canals.

The following are the areas that will be commanded by these canals, when completed to the extent already sanctioned by the Secretary of State :—

BENGAL.

	Acres.	Sq. miles.
Orissa - - -	181,000	362
Midnapore - -	140,000	280
Behar - - -	1,000,000	2,000
Total - - -	1,321,000	2,642

In Midnapore, however, owing to defective water-supply, not more than 60,000 acres could be effectually protected in the very worst years. On the other hand, a comparatively small additional outlay in distribution, for which sanction has already been asked, will double the irrigable area in Orissa. Thus the total area which the works now in progress will protect may be taken as 1,421,000 acres, or 2,842 square miles. But the area for which distribution had been constructed up to the end of 1877-78 was not above 500,000 acres. The irrigation of this latter tract only may be presumed to be thoroughly effective at present.

The Mahanuddy and Sone, which supply the canals in Orissa and Behar, though fed only by the monsoon rains, have an unfailing supply for the areas above stated. In the case of Midnapore the catchment basin of the river is so small that the supply varies with the local rains, and fails to a considerable extent in years of extreme drought, such as 1873-74.

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Mr. Nicholls.

What area of your province and of its several districts is protected from drought in an average year by irrigation from—

- (1.) Canals, jhils, or channels from rivers?
- (2.) From wells and tanks?

There are no canals or jhils. The depth of the

river beds below the ordinary level of the land also precludes, save in perhaps a very few instances, the construction of irrigation channels from rivers. No such channels have been constructed.

Statistics of irrigation from wells and tanks are given in the following statement :—

STATEMENT showing the Area irrigated in each District.

Districts.	Area in acres irrigated from wells and tanks.		Districts.	Area in acres irrigated from wells and tanks.	
Nagpur - - -	12,492	302,500 irrigated from tanks. 134,901 do. do.	Manda - - -	1,219	189,445 irrigated from tanks.
Bhandara - - -	320,863		Narsinghpur - - -	2,455	
Chanda - - -	146,945		Nimar - - -	9,257	
Wardha - - -	4,859		Betul - - -	12,163	
Balaghat - - -	10,287		Chhindwara - - -	7,702	
Upper Godavari - - -	4,616		Narsinghpur - - -	6,892	
Jubbulpore - - -	3,949		Raipur - - -	10,813	
Saugor - - -	4,507		Bilaspur - - -	196,161	
Damoh - - -	1,271		Sambalpur - - -	-	
Seoni - - -	18,451		Total - - -	774,902	

I give the following extracts from settlement reports to illustrate this statement :—

“*Bilaspur*.—At the same time the country is not entirely dependent on the regularity of the monsoon. There are scattered over the district some 7,000 tanks, which the forethought of succeeding generations has contributed to construct. Although not entirely available for watering the fields (for many are strictly preserved to provide water during the heats of summer for man and beast), yet a large number are utilised for purposes of irrigation, and thus some portion of the crop in numerous villages at all times comes to be saved. To increase the means of artificial irrigation is as desirable an object in Chhattisgarh as in other

parts of India; but the construction of canals or capacious reservoirs of water to achieve this end, is not likely to be attempted during this generation.

“These great works can only be effected by a large outlay, and it is certain that at present they would not be remunerative. I mean remunerative in a practical, not a philanthropic sense. Such works render a famine impossible, but for ordinary crops water would only be taken in special seasons, while sugar-cane and other irrigated products would not for years be extensively enough cultivated to yield a large annual income. In fact a scant population and a large irrigated area cannot co-exist, and therefore in Chhattisgarh the best assistance the agricultural classes can

receive is the liberal aid of takavi advances to extend on all sides the gradual construction of tanks.

“*Chanda*.—Irrigation is carried on from :—

Tanks.
Borees or ponds.
Gattas.
Wells in fields.

Springs, pools and shallows, wells in the beds of streams; the number of the first, second and fourth being—

Tanks - - -	1,749
Borees - - -	1,831
Field wells - - -	767

“In selecting a site for a large tank the following points have to be kept in view :—

“The situation must be near hills and receive their drainage, so that the tank may fill quickly, however small the rain-fall.

“The position must allow of an ample escape channel being dug in firm rocky soil, with a course which will take off the flood waters without injury to the dam or to the cultivation.

“The dam must be short and not exposed to any violent rush from the in-coming water. Good land for wet cultivation must be below the tank, at not a greater distance than two or three miles, and be so situated as to permit the tank water flowing over all parts of it.

“The dyke is constructed of earth faced with rough blocks of stone, and the water is led through by a system of vertical and horizontal ducts built of stone. This arrangement gives a perfect control over the out-flow, and throws upon the passages little beyond the downward pressure of the water—indeed a properly constructed ‘tooroom,’ as these sluices are called, is as strong as any other part of the embankment, and on reaching the outside of the dam, the water is conducted to the fields by open channels. The large tanks of Chanda are admirably situated and embanked, and form magnificent reservoirs, but the great mass of water thus walled back entails constant care during the rains, and the dyke is then anxiously watched by day and night. When floods are out and the level rising fast, the watchers beat the alarm drum, and the whole village thereupon hurries to the tank, some to keep the escape channel clear, others to repair on the instant ought that gives signs of yielding in the dam. Thus hours go by in battling with the waters, and at last the crisis is over, and the workers return glad and wet and weary to their homes. The Taroba lake, however, has a dam sixty feet high in perfect condition, and yet for centuries that dam has not been repaired. The outflow of water in small tanks is provided for by a wooden tunnel, generally formed of the hollowed trunk of a mohwa tree, the wood of which will remain good under the action of water for many years. But these passages weaken the embankment considerably, and not unfrequently lead to its giving way.

“In borees the dam is cut through yearly, and the water allowed to run off as required, the breach being repaired before the setting in of the next rains.

“In gattas the land above the dam is cultivated. To construct a gatta, a miniature valley, with gently sloping sides through which the stream flows, is chosen. The space between the banks of the stream is built up in the hot weather with trunks of trees, having their thinner end towards the point from which the current flows, and across these are fixed smaller logs and brushwood. The up-stream face has thus a gentle slope to the front, while the rear face is almost perpendicular, and is sometimes strengthened by vertical stakes. The barricade is carried from four to eight feet above the level of the banks, and is then heaped with earth. As soon as the first rains have softened the ground, sods about 15 inches long by 12 broad and five thick are dug with a heavy teak implement, called a katwa, and with the sods wing embankments are built. These are run out in continuation of and level with the log barricade, until the rise of the valley sides reduces their height to about a foot, when they

are sloped off to the front, and flanks and pipes of mhowa, eyn, or gongul are put through; similar gattas are constructed at convenient distances at other points of the stream, and if the situation be favourable twenty of these gattas may be seen spanning the valley in regular series. Surplus water passes round the flanks of the gatta, and sometimes in floods the stream tops the dam and cascades over. Rice is planted in the wet ground above the dam, and where there is a succession of gattas, water, if required, is passed from a higher to a lower level through the wooden pipes in the embankment. Some of the gattas rise to 20 feet above the stream bed, and are very substantial structures, flooding large areas.

“Water from wells and pools is raised either by the mot (leather bag) and bullocks or by means of a long pole working on a pivot between two upright posts, and having a leather bucket at one end, which dips into the water, and a weight at the other, which assists the labourer in raising the full bucket.

“*Wardha*.—Tank irrigation is unknown; the sites for reservoirs are not numerous, owing to the small extent of hill country which, with its entanglement of ravines and gorges, generally affords the greatest facilities for the construction of artificial lakes. What irrigation there is, is from wells, and is to be found chiefly in a few villages of the Anji and Nachangaon pergannas, where enterprising malis and telis, having dug wells, cultivate small garden plots close round the village sites. In these gardens native vegetables in small quantities are grown. The crops raised are opium, the betel leaf (pan), turmeric, and sugar-cane, all of which require very careful cultivation. They return, however, a high profit if the season is not altogether unpropitious. The vegetables raised are sold in large quantities at the weekly markets, and are of the ordinary descriptions most liked by the natives.”

“*Nagpur*.—The same description applies alike to the Nagpur district. There is some irrigation of sugar-cane from the Sur River, which has a particularly shallow bed. Tank irrigation is confined to the celebrated pan gardens in the north of the district.

“*Chhindwara*.—In the Chhindwara district the chief crop raised by irrigation is sugar-cane; other garden crops are also grown; sugar, opium, and potatoes by all classes, the rest only by kachis and malis. Irrigation is chiefly carried on from wells by means of a leather bag termed a “mot,” which is let down by a rope of hide over a wheel, and drawn by a pair of bullocks proceeding down an inclined plane, until the bag reaches the top and its contents are discharged into a trough leading into the water channel. The bullocks are walked backwards up the incline until the bag again reaches the water and is filled. The same plan is also adopted in drawing water out of streams dammed up for the purpose. Persian wheels are quite unknown. Tank irrigation is scarcely practised in Chhindwara. The mot requires one man to raise the water and one to distribute.

The Persian wheel requires two men to raise the water and a third to distribute. It raises more water, and does not wear out the bullocks so quickly. But it continually requires repairs, and tolerably skilled carpenters are very rare in our villages.

“*Betul*.—Opium was a considerable crop irrigated from wells. It will now be replaced by an increase of sugar-cane and garden vegetables.

There are but few tanks in the district, and none of them are used for irrigation. Around Betul itself wells are chiefly shored up with wooden logs laid hexagonally or otherwise round the sides. These will last for 20 years if the wood used be teak.

In Multai, where stone is plentiful, the wells in places are built of it; but the majority of wells are kucha, having no support beyond that of the native rock; very few are built of brick. The supply of water generally throughout the district is most abundant, and it is no uncommon thing for a well to irrigate six or even eight acres of land; the “mot,”

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however, must in these cases be kept constantly going, and frequent changes of bullocks are required.

Mandla.—In Mandla there is nothing beyond gardens, pan, and sugar-cane irrigated from wells by the "mot." In the rich regar lands, where the fields are embanked or "bundled," double crops are produced every year without deterioration of the soil.

Rice grows luxuriantly in them, and weeds are not very difficult to keep down. After the rice comes the second crop of wheat or some description of pulse.

The Settlement Officer, Captain Thompson, was an enthusiast as regards irrigation. He writes:—

"**Seoni.**—There is also every reason to hope for improvement in cultivation by the introduction of the embanking system. It has, as I have before mentioned, been carried on regularly amongst the south country cultivators, the 'Powars,' &c., and I have for years been trying to induce the western Hindu cultivators to take to it, dilating on its advantages and pointing to the example of the Powars, but have always been put off with excuses, either that the force of the surface drainage was too great, or that the soil was too friable to stand in bunds, or something. But now, the proprietary questions being all decided, and assessments declared, the people are taking to the system a great deal; so much is it the case, that the Deputy Commissioner, who has been comparatively a short time in the district, noticed it. The system, if carried out, would of course increase the produce very considerably, and it will most probably lead to manuring. If to these improvements on the part of the people is added the construction by Government of irrigation reservoirs, suggested by me officially, the increase in produce and in cultivation, more especially of the valuable crops, sugar, opium, and the like, would be almost unlimited; and it would acquire a permanence and certainty which can never be hoped for in any other system."

But Mr. Wardlaw, who had an intimate knowledge of the country, and effected some early settlements, writing in 1831, observes:—

"The country also generally speaking is extremely unfavourable for irrigation being had recourse to, in consequence of the unevenness of its surface, and without it I imagine that manuring would be found to occasion an expense which the improved return of the crops would by no means repay, and unless some clear and distinct prospect of gain is pointed out to our agricultural subjects they have not the means nor even the inclination to attempt any speculative improvement of a precarious nature. If bunding the lands in this district could be accomplished it would not only be a source of considerable profit to the cultivators, and render the success of the crop more certain, but would greatly increase the revenue of Government. In the taluks of Hirdinugger and Tirhotie, in the tahsildari of Mandla, and in a few of the villages in Burgee which border on the Narsinghpur district, the lands are banked; but in no other part of the Seoni district will it answer for the rabi cultivation, I mean, for the low flat rice lands* of Katangi and Karolah are all embanked.

"The reason given for its not succeeding is that the country is not sufficiently level, but the chief one I believe is that the soil does not possess that adhesive quality which is indispensably necessary to keep the water within its proper bounds, and to prevent it from oozing out. The experiment has been tried, but invariably failed; the water first began to get out by degrees, till at length the embankment was completely swept off. The next thing to be considered is that of the introduction of more valuable crops; but this also is attended with its concomitant difficulties, viz., the general poverty of the people, and the great want of that spirit of enterprise and speculation in those who do possess the means. The growth of sugar-cane, for instance, might with advantage be very considerably increased and prove a source of great profit, both to the cultivator and the purchaser."

* Now belonging to the Balaghat district.

The Settlement Officer, Mr. C. A. Elliott, B. C. S., writes:—

"**Hoshangabad.**—The large crops, kharif and rabi, as a rule, are neither manured nor irrigated. Opium, tobacco, pan, rice, sugar-cane, melons, and all the small market garden crops which kachis sow, are manured; and all except rice, tobacco, and melons are irrigated. But they are considered as a kind of fancy agriculture, and the true cultivator, the kirsan, looks on them with contempt, as little peddling matters; and what stirs his ambition is a fine large wheat field (gohali) 80 or 100 acres in extent, as flat as a billiard board and as black as a Gond.

"There is no tank irrigation."

The Settlement Officer, the late Captain Forsyth, wrote:—

"**Nimar.**—The geological structure and physical conformation of the district have been described as peculiarly favourable to irrigation, both by wells and from dams across the numerous streams.

"The water-bearing stratum is reached by wells in most parts, at from 10 to 20 feet from the surface. In some parts there is a supply up to the month of March within 10 or 12 feet. In the more open valleys of the Tapti and Nerbudda it is not reached at all within 90 or 100 feet; and, as in all trap formations, occasional instances are found where some unsoundness in the underlying rock deprives the surface strata of all water accessible by wells. The neighbourhood of the Khandwa civil station is an unfortunate instance of this. In many places there is nothing to get through to reach the water but mooram (partially disintegrated trap); in others hard trap is come upon, which cannot be overcome except by blasting, which the common ryot seldom attempts. A masonry lining is seldom required at first, except where there is deep black, or man soil, but without a retaining wall the mooram soon decomposes and slips into the well, which thus gradually widens and requires annual repairs, or after some years may even have to be abandoned. It costs about Rs. 40 at present rates to sink a well through 15 feet of mooram, and Rs. 400 to thoroughly line it with masonry, which is very seldom done. The ordinary mot or leathern bag, drawn by a pair of bullocks walking down an inclined plane, with painful retrogression up the same, is the only method employed for raising the water from wells. I do not recollect noticing in other districts a fashion they have here of lightening the labour of the ox by placing a bundle of methee or some other succulent fodder at the bottom of the incline, on reaching which at each turn one scanty mouthful is allowed. The annual cost of mot and ropes and wooden fittings is about Rs. 8. An average sized mot holds $5\frac{1}{2}$ cubic feet of water and is raised about once a minute in a 15-foot well. A pair of bullocks can work nine hours a day, so that the discharge is 2,870 cubic feet per diem. An ordinary flooding of one acre takes about 15,000 cubic feet of water, so that about five days are required to flood that area of land; spring crops require four such floodings, and therefore take twenty days' labour of one pair of bullocks per acre fully irrigated. One man can work the mot and bullocks, with a double rope to regulate the discharge; and one additional hand, who may be a woman or boy, is generally engaged in arranging the flow of water in the fields, but is often dispensed with, the bullock man doing this as well.

"A dam across a small stream for irrigation is called a *pat*. It is composed of heavy stones and brushwood puddled with clay, and is removed each year to allow the force of the monsoon floods to pass, and replaced about November for the irrigation of the rabi (spring) crop, which is the only crop (except garden and sugar-cane) irrigated in Nimar. It costs little to make with the united labour of all concerned, and is very effective for cold weather irrigation. It is usually built slanting across the stream, the channel being led out at the lower end. This channel is a mere ditch cleared out annually. It sometimes runs

a mile or more before reaching such a level as to command the land for irrigation. The average area watered by each pat is very small, namely 17 acres. There are 36 usually going, but the number varies a good deal with the amount of the rain-fall. This rough but effective system of irrigation is much practised, I believe, in Afghanistan and other Mahomedan countries, and seems to have been introduced in India by the Moghuls wherever they ruled.

"The physical conformation of Northern Nimar does not appear to be favourable for the construction of irrigation tanks, the porosity of the sub-soil and the feature common, I believe, to all trap countries, of unsoundness in the underlying rocks, admit of such an amount of percolation as to render the retention of water in high-level tanks a matter of great difficulty. Thus of the numerous tanks constructed or repaired by the district officer in 1846, only one is now of any use for direct irrigation; another result aimed at by the construction of many of those tanks has however been partially attained, namely, the retention of moisture near the surface, so that it can be tapped by shallow wells in some places where, owing to peculiar features, water was very scarce at reasonable depths in the hot weather. On the whole, however, I fear a great deal of the money then spent was quite thrown away, save in so far as it gave employment to the people in a time of considerable scarcity.

"The solitary instance of a successful irrigating tank in the districts is the Luchora reservoir in perganna Beria, which irrigates from 170 to 250 acres of the land of Kusba Beria according to the amount of the rain-fall supply. This reservoir was originally constructed by the Ghori kings of Mandoo, and consists of a large earthwork bund thrown across the mouth of a valley in the low hills which bound the open Nerbudda valley to the south. It could never have paid anything like a fair per-centage on its original cost. The water that can be stored is generally but little more than is required for the above small area, though an additional extent of land in Holkar's adjoining villages of Bhatoor and Sekunderkhari might be irrigated were the bund strengthened so as to retain the whole of the ordinary water supply available. The repairs in 1846 consisted of closing up the gap which had formed in the bund, and constructing a masonry sluice and other works of delivery, and a masonry channel for a considerable part of the distance over which the water has to be led to the lands of Beria. The channel runs right through the bazar town of Beria, and has been, no doubt, of great benefit to the place. It has also yielded a good return of profit on the cost of repairs, which was Rs. 5,000. The revenue due to the water received during the settlement amounts to Rs. 495, or nearly 10 per cent. per annum. This is perhaps the most remarkable instance in the district of the effects of manure and water. The soil is naturally very light *mal*, and a great part of it mere *khurrah*, of the poorest sort. Yet by manuring every second or third year, and with the abundant supply of tank water they have (which has not the defects of that led directly from streams), twelve-fold returns of wheat are regularly got, and in intermediate years heavy crops of gram and other pulses. 'If you manure and water a stone,' said a Beria Kunbi to me, 'it will yield something.'

"In addition to this tank two masonry dams (*bundan*) across the river Abna were constructed about the same time by the district officer. They were not quite so successful as the Luchora scheme in a revenue point of view. That at Mauza Kharwa costs Rs. 2,407, irrigates about 57 acres, and has paid Rs. 2,396 in 21 years, or not quite five per cent. on its cost. That at Khondia is still smaller. Another dam was commenced across the Abna river at Siloda, about eight miles above Khandwa, but was never finished, owing to the failure of funds.

"The labour of one hand only, to regulate the field channels, is required in channel irrigation, either from tanks or river dams. The total area under irrigation

from all these sources is still only 8,411 acres, or not quite three per cent. of the whole cultivated area. This is a considerable increase on the breadth irrigated previous to the commencement of good administration in 1846. I cannot get statistics of the channel irrigation at that time which can be compared with those now ascertained. But the well irrigation of those pargannas which still belong to the district seems to have then amounted to only 2,327 acres, while it is now 7,423 acres, an increase of 220 per cent. The increase, since last settlement, of irrigation, both well and channel in the settled pargannas has been from 4,995 to 7,413 acres, or 46 per cent., a result not perhaps unsatisfactory, but still much below what might have been attained had the flood-gates of capital been fully opened by the 'magic of property.'

"Contrary to an opinion often expressed, well water is here considered to be more fertilising than that of streams. A difference of one Nimari maund (128 lbs. per acre in an irrigated wheat crop, or about 13 per cent. of the maximum yield,) is said to represent their respective values. The people say the channel water is too cold. I should be inclined to attribute this circumstance to two causes: first, that the small streams rapidly running off the almost denuded hills bring down comparatively little fertilising matter in suspension, as the more sluggish streams of Upper India do, while the trees which usually overhang the wells contribute a considerable amount of such matter to their water; and secondly, that the channel water, where several cultivators have to be served, cannot be given to the fields exactly as it is required, and often lies all night on the surface of the sodden ground, thus tending to rot the stems, while well water can be given in such amount and at such times as is wanted, and in the day-time when the heat of the sun aids it in rapidly percolating to the roots, the stems being kept dry by evaporation.

"**Bhandara** (from the Central Provinces' Gazetteer).—This part of the country is chiefly cultivated by means of irrigation from tanks, for which the Bhandara district is famous. 'These tanks,' writes a former Chief Commissioner, Sir Richard Temple, 'are so numerous, and some of them so large, being many miles in circumference, that this tract might almost be called the Lake Region of Nagpur. Here a tank is not a piece of water, with regular banks crowned with rows or avenues of trees, with an artificial dyke and sluices, and with fields around it, but it is an irregular expanse of water; its banks are formed by rugged hills covered with low forests that fringe the water, where the wild beasts repair to drink; its dykes, mainly shaped out of spurs from the hills, are thrown athwart the hollows, a part only being formed by masonry; its sluices often consist of chasms or fissures in the rock; its broad surface is often, as the monsoon approaches, lashed into surging and crested waves.' The principal lakes are known by the names of Nawagaon, Seoni, and Sonagaon. Besides these are thousands of minor tanks, used for irrigation, many of which retain an ample supply of water throughout the hot season. There are also numerous sites for new tanks of large size, now ruined and requiring repair, though at such an outlay as to render the undertaking one of doubtful advantage.

"Major Pearson, late Conservator of Forests, Central Provinces, in a report upon the irrigation of the valley of the Wainganga, submitted to the Chief Commissioner in March 1863, points out that there are two distinct kinds of tanks in this region. He describes them in the following passage:—

"The first and by far the largest are formed in the undulating country of the lower districts in the valley, by taking advantage of the contour of the ground, and constructing a short dam so as to form a lake or basin for the drainage of the surrounding hills. The second-class is that commonly found in the flatter country, and away from the hills, where a long low dam is raised across the upper portion

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of a gently sloping plain. These are more or less excavated near the centre, where some nala or depression of the ground is taken advantage of to create a reservoir more or less deep.

"The long arms of the dam collect the drainage, which fills into the centre reservoir, and when this is full, spreads itself out into a large shallow tank; the water is thence distributed to the rice fields below; and although there is an enormous loss from evaporation, yet, as the rice does not require water for above two months, or at most 75 days, the tanks generally suffice for the purpose required. Tanks of the last description are sometimes of very large size, but commonly they are what are called 'boris,' having embankments not more than 10 or 12 feet high, and as soon as the rice crop is gathered, the dam is cut, any remaining water let out, and a crop of wheat or linseed sown in the bed. This is almost a universal practice in the northern pergunas of Bhandara. Indeed it seems the only means of raising a dry crop which the people possess in those districts. I have seen several very large tanks so drained and cultivated.

"There are altogether 3,648 lakes and tanks; some of the rivers also afford facilities for irrigation. The Bhowanthari, for instance, which runs from east to west of the pergunna of Chandpur, supplies water for the cultivation of sugar-cane, which is grown in large quantities on both banks."

Bhandara Settlement Report.—"The wells of the district used in irrigation are almost entirely applied to the raising of garden crops. At the time of measurement there were 1,248 irrigation wells, including masonry wells and mere shafts sunk in the earth. There are said to be 3,720 wells for drinking purposes of all kinds, so that the total of wells throughout the district is 4,968; of these, but 925 are returned as being substantial. Many wells have their sides protected by wooden boards, instead of by masonry wall sides. These wooden walls are numerous, and preferred by the people to the more expensive structures with trap or laterite walls. It is only now that permanent and substantial wells are being generally constructed. The irrigation wells are easily sunk, and at slight expense, but they are only required by certain classes of the population. Again the area watered by a single well seldom exceeds two acres. The cultivators who irrigate from wells, always belong to the Murar class. He bears the cost of irrigation, and yet is able to pay a heavy rate on his garden plot. The Bariah-murar raises sugar-cane and vegetables in his garden plot, while the Phul-malis are more addicted to the culture of fruits and flowers. They are the only class who really make a living by irrigated cultivation. Ponwar landholders often have a small irrigated plot close to their dwellings, and raise therein a few edible herbs; but small plots like this cannot be reckoned a part of the regular agricultural system. Gram and wheat are never irrigated. The water for the rice fields is supplied by tanks; for betel gardens, and for sugar-cane fields in the regular sugar-cane yielding tracts of the south, water is drawn from the nearest tank or reservoir."

Raipur.—From Central Provinces Gazetteer.—

"One of the most distinguishing features of the district is the great number of tanks. These are generally formed by throwing a dam across a hollow, but in most large villages there are one if not more tanks to be found embanked on all four sides, and planted with trees, the work of some public spirited villager or perhaps of some enterprising Banjara, who used to pasture his cattle in the village in the day when the jungle was uncut. These tanks, which depend almost entirely on the rain-fall for their water supply, are considered on that account to give better drinking water than those formed by throwing a dam across the valleys, and in this respect they must be allowed to have some advantages; but as but little care is taken to keep them clear, the water before the hot weather is generally a muddy mass of impurity; besides the trees round the tanks there are but few to be seen throughout the greater part of the district; and mango groves, so

common in Upper India, are here few and far between. Wells were unknown in the district till the last two years, but the recent orders granting rent-free land to persons digging wells have led to the construction of wells lined with masonry in many of the khalsa villages. Along the banks of the Mahanadi and to the south of the district water is found at from 12 to 24 feet from the surface; but in the east it is not so easily procured."

Raipur.—"Well irrigation is practised to a small extent at present, but it is confined chiefly to garden produce, nor is it possible that it will ever be largely used in Chhattisgarh, as the nature of the soil in most parts makes well digging very difficult. Sugar-cane is generally irrigated from tanks, though when no tank is available and water is near the surface, well irrigation is used. Rice is rarely irrigated, except where there is a failure in the rain-fall; but the means for distributing the water are very imperfect, the only means in use being the cutting of the tank bunds, for sluices are unknown; and as to cut a wide channel through the bund would destroy the tank, those cut are so narrow as to irrigate but a very small portion of the land, while the stream is at best so slender as to effect but little good. In the present year (1869), when a large portion of the crop has been lost from want of rain, the efforts to save it by letting the tank water into the fields have in every instance that I have seen been almost abortive.

"The same causes that prevent the application of more labour and money to cultivation would prevent the success of irrigation, and therefore the question of the irrigation of the country is not one that presses at present; but in time it will become of the utmost importance, for Chhattisgarh is a rice country, and rice must have water. Hence when the population increases to such an extent that the produce leaves only a small surplus after providing for the consumption of the country, or when trade becomes so brisk as to draw largely upon the grain stocks of the people, a season or two of short crops cannot be borne as at present without much distress, and a scientific system of irrigation will have to be introduced to prevent the great evils that must befall a country without internal resources, especially one which is, as Raipur must always be, remote from any adequate source of supply. Facilities for such a system exist in abundance in the surplus waters of the rivers, while in the interior the valleys between the rolling uplands present numerous sites where large reservoirs could be made."

Sambalpur.—From the Deputy Commissioner's report on the scarcity of 1868-69.—"It is also to the energy and enterprise of these same men (the Gaontahs, or headmen of the villages) that we owe the numerous tanks which stud the face of the khalsa part of this district, and which saved so much of the rice crop both in 1865 and in 1869.

"The varieties of rice cultivation comprise:—

"2nd.—That grown on the 'mal' lands, which are also comparatively high, though generally more level than the 'at' lands, and where the fields are surrounded by low embankments.

"3rd.—That grown on the low-lying or 'bahal' and 'berna' lands. The former of these terms is applied to the lands under the tanks, and the latter to the dips and hollows between the 'mal' or 'at' lands. In both of these classes of lands the fields are surrounded by strong and high embankments, and the bahal lands are susceptible of irrigation from the tanks.

"A great part of the rice sown on the bahal and berna lands is transplanted; it is the late and most important crop.

"In the case of bahal lands it is possible to perform most of the necessary processes of cultivation, although the rain may not fall just when it is desirable."

The late Commissioner of Raipur, who had been Deputy Commissioner of Sambalpur for years, also wrote:—

"In the khalsa portion of the Sambalpur district scarcely a village is without an irrigating tank, as well

as an ordinary drinking tank; so that, no matter how the rain is distributed, so long as it is plentiful, the crops of rich rice lands lying in the vicinity of the tanks can nearly always be saved. The 'bunds' or embankments also of the Sambalpur rice fields are much higher than those of the other districts."

In a report on the district written by Lieutenant Birch in 1857, he states that the undulations of the surface of the land afford great facilities for regular irrigation.

Narsinghpur.—"Manuring and irrigation are almost unknown, except for sugar-cane and vegetables. There is a fine tract, containing 50 or 60 villages lying on the borders of the Gadawara and Narsinghpur pergunnas, the rates of the rent and revenue paid in which show how profitably both processes might be adopted. The staple produce of these villages is sugar-cane, irrigated from unlined (katcha) wells by means of the Persian wheel. The favourable lie of the sub-strata gives unusual facilities for irrigation here."

There is no tank irrigation.

"The nature of the soil has something to do with this apathy. It is deep, retentive of moisture, and most tenacious in its texture. Hence the amount of working and irrigation which might amply fertilize lighter soils would here be thrown away. It must be, and in the case of sugar-cane is, kept constantly irrigated to prevent the rapid induration and subsequent fissility which characterize it in its drying state. Hence irrigation here necessitates more labour and expense than in lighter soils, and though by softening the soil cultivators would avoid two great sources of damage to which they are now subject, viz., loss of the seed which drops into the fissures of the earth, and occasional loss of land, which dries up before they can plough it, they prefer the present easy system, under which they are certain of a maintenance to a life of laboriousness which would neither suit their habits nor seems required by their necessities.

"The course which improvement will probably first take will be extension of the embankments already prevalent in the Srinagar pergunna, the people of which have probably taken example by their neighbours of the Jubbulpore district. These embankments retain the rain water which is let off before the autumn ploughings, leaving a sufficient amount of moisture in the deep retentive soil to ensure the life of the winter crop. They are, in fact, a substitute for irrigation, which, however valuable, is not so indispensable in this valley as in the plains of Northern India, where, unlike here, the soil is capable of retaining moisture, and no scattered hill ranges attract refreshing clouds and mists.

"The embankments have other advantages, among which may be mentioned that the flooding of the fields is the only known remedy against the growth of the rank 'khans,' and that in embanked (bundd or bundwas) lands two crops—rice, followed by gram or lentil—may be produced in one year without prejudice to the soil."

Jubbulpore.—In Jubbulpore the well irrigation is but trifling. Tank irrigation is not considerable, and is confined to the raising of pan and some sugar-cane. But this is the chief seat of the "banwas" cultivation. The late Sir Donald MacLeod writing in 1842 says:—

"To the north-east and north-west an exceedingly rich and open plain opens out, the whole of which constituting the pergunnas of Kumbhi, Sohara, and Garha is formed by small embankments into separate fields devoted entirely to rabi crops,—a species of husbandry which the writer has not seen practised elsewhere. No manure is used, but the land having been slightly run by a bullock plough before the setting in of the rains, both to turn it and to eradicate all weeds which may have formed, all the water which may fall upon the surface of the field during the season is confined within its bunds, and when the sowing season comes round, the surplus of moisture remaining is drawn off by cutting the embankment. This process appears to have a

powerful fertilizing effect, and when the land has dried, no ploughing whatever is required further than passing through the ground the 'nagar' or drill plough, by which the seed is sown. The plan here described is of ancient standing, and it is very fortunate that it is not overlooked to be duly recorded in the measurement papers prepared for the new Settlement."

Settlement Report.—"The system of agriculture followed in this district being peculiar to itself, a short description of it may appropriately be given here. The method by which moisture is supplied to land sown with spring crops, as a substitute for the artificial means of irrigation practised elsewhere, has already been alluded to when describing the difference between tagur and bundwas or embanked lands. The principal portion of the haveli or open and level pergunnas of the district, which constitute more than half of it, are thus embanked. The bunds are repaired annually during the dry season, and immediately before the rains set in the openings or cuts ('moghas') made in the embankments at the conclusion of the previous rainy season for draining off the water are closed up, and the land is turned over with a light plough. As soon as the rain falls, and where the soil is suited for it, that is 'kabar,' which can bear a double crop for successive years, paddy is sown broadcast; but such fields as are not suited for paddy are allowed to lie fallow, merely filled with water, until the middle of October, if the rains have continued to the end of September, or otherwise earlier, when the 'moghas' or cuts are opened in succession, first those of the highest fields and consecutively to the lowest; as the sowing season approaches to a termination, this and the deposit from the rotting of weeds, &c., bring two very important advantages possessed by a bundwas over a tagur field. As soon as the field begins to dry, generally the second or third day after the water is drained, wheat or gram is sown with the drill plough without any previous ploughing. As the drill plough passes through the soil, it is turned up in large clods, and from the adhesive nature of it, as well as from the wet state in which it is when the sowing begins, a more elaborate system of ploughing would not be practicable; and if the soil was allowed to be hardened before being ploughed, it would dry so fast that the seed would not germinate for want of moisture. Immediately the soil hardens, it cracks and opens out into large fissures, so that irrigation is generally impracticable. In such fields as have been sown with paddy crops, should the paddy not ripen soon enough to allow of wheat being sown in proper time, gram is sown broadcast, while the paddy is still standing, and by the time the gram comes up the paddy is fit to be reaped, which is done carefully so as to prevent the gram from being injured. This is called the ootera or chilka sowing, but the produce is nothing equal to that obtained by the regular method. Sometimes the same plan is followed in respect to fields not sown with paddy, if there is fear of the land drying before the drill plough can be used from want of bullocks or other cause, but in such cases the gram is scattered over the field two days before drawing off the water, when it takes root and is not washed away by the retiring current.

"The lowest fields from which the water escapes into a river or stream are called the 'boh'.' This 'boh' is reckoned a great treasure, and generally belongs to the malguzar's home farm; it is enriched by what is called the 'sussum' or small particles of decayed vegetable and animal matter escaping with the water when drawn off the higher fields, and consequently bears very rich crops. After the wheat, gram, mussur, and ulsi crops have been sown, no subsequent moisture by irrigation is needed. If there is seasonable rain in the winter, the out-turn is generally very good; if not it is an average crop; but if there is too much rain in the winter, or the cold severe, the crops suffer from blight or from frost, except the wheat, which is not affected by frost. It

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CHAP. I. QN. 4. is to guard against these contingencies that the common practice of sowing wheat and gram together called 'birra' has been introduced, so that if the one fails or is partially injured, the other generally escapes damage. Mr. Malony's* remarks regarding the small risks to which cultivators are exposed in the Haveli tracts are very appropriate, and may be quoted here:—

"The only risks to which cultivators seem liable in the Haveli are from frost or from very scanty rains in the rainy season, that is rains so scanty as not to fill the khets. If the khets are over-filled, the early breaking up of the rains, or the want of rain in the cold weather, are here of no consequence. But if the khets do not fill, there is a chance of total failure; first because black soil hardens more rapidly and completely than the brown or reddish soil, and secondly, because the people have not the means of meeting the demand for increased labour and rapid sowing which this state of things occasions. There must always be rain enough to make the ground moist and fit for ploughing, even when there is not enough to keep it so, or to prevent the growth of weeds. If, therefore, a large number of ploughs could be brought to work upon it early and at once, it might be still sown, even though the khets did not fill.

"But in ordinary circumstances this land requires so very little labour, that a plough of four bullocks can cultivate, I believe, 12 or 16 'toosies.' The number of kisans and bullocks is proportioned to this facility, and, therefore, when the khets do not fill, there are not hands or ploughs to meet the emergency."

These are the circumstances which operate against the people of this district taking much interest in appliances for irrigation, improved modes of agriculture, &c., which we are so anxious to introduce to their notice. Of course bundwas lands differ in value according to their position, those bordering on rivers and streams being often so far from flat as to partake of many of the disadvantages of tagur or unembanked lands. The bunds, too, in such parts require more frequent and larger outlay to keep in repair, while in villages situated in level country the fields are as flat as a table and perfectly uniform in appearance.

Saugor Settlement Report.—In the Banda Tahsil of the Saugor district irrigation is little resorted to, and that only for raising crops of vegetables and watering sugar-cane. Irrigation might be extensively introduced had the people energy and means sufficient to avail themselves of the facility of obtaining water, which is to be found 37 feet from the surface.

Shahgarh.—To the south irrigation does not appear necessary, the soil being generally of a better quality; still the cultivation is slovenly, and there are no signs of enterprise. Here, again, the khans grass is the great enemy of the cultivator.

Saugor tahsil.—It has been already stated that irrigation is hardly ever resorted to, and is less than 2 per cent. on the cultivated area; still I am of opinion, notwithstanding assertions to the contrary, based upon the nature of the soil, that irrigation might be largely employed, if the people had energy and means sufficient to avail themselves of the facilities of obtaining water from the numerous streams which intersect the pergunna, and by means of wells, for the water is not far from the surface.

I have seen the effect of irrigation near some village sites, and can vouch for its development on wheat, which in size and weight was equal to that produced in England.

It is well known that, during the earlier and good portion of the Mahratta rule, a vast number of wells were excavated for purposes of irrigation, now mostly filled up; and it was only when the revenues of the pergunna were alienated, and the villages made over to creditors, that the funds usually advanced by

* Mr. Malony was the first civil officer appointed to the Jubbulpore country after its cession in 1818.

capitalists for cultivation were withdrawn, and proprietors and cultivators abandoned the most remunerative crops, and irrigation fell almost entirely into disuse.

In Jeysinghnagar irrigation is hardly ever resorted to. The principal tanks are those of Khorai khas, Khemlassa, Garhola, and Chandrapore.

These are not of great size; that of Garhola dries up in the hot weather.

Damoh.—In Damoh there is no irrigation from streams or tanks. The tanks are not numerous, and are only utilized for planting "singharas" or water nuts, and for washing and drinking. Wells can be very easily made, as the water is particularly near to the surface. Bataghat is similar to Bhandara. In the Katanghi Karoulah tract, received from Seoni, all the fields are embanked.

To how much of this area is the protection complete and permanent, and how much is dependent on the local rain?

I have now given the facts regarding existing irrigation, and the opinions of the local officers. Evidently all of the embanked lands of the Jubbulpore, Mandla, and Narsinghpur "banwas" tracts depend on the rainfall. My opinion is that not more than one-tenth of the area irrigated from tanks, and one-fourth of that irrigated from wells, can be considered as other than dependent on the local rain.

How much of the area so protected is devoted to food crops, and what is the total amount of produce from that area?

Out of this $\frac{1}{4}$ permanently protected by wells, I am of opinion that all is cultivated with opium, sugar-cane, or garden vegetables.

Out of 626,000 acres irrigated from tanks, I estimate 62,000 acres as permanently protected. Probably 2,000 of these are for pan cultivation (reckoning fallows as well as under cultivation), and the rest, save an almost infinitesimal portion for "rice seed beds," will be used for sugar-cane and small garden cultivation. I think the sugar-cane cultivation will require this area of permanently protected land.

Bhandara	-	-	7,500 acres.
Sambalpur	-	-	9,000 "
Raipur	-	-	27,000 "
Chanda	-	-	5,000 "

and other districts in smaller areas.

As for the effect of irrigation of crops (other than food crops) in adding to the powers of the population to resist famine, on the population at large it must be almost inappreciable, for we do not raise a sufficiency of these crops, and import sugar, gur, and opium.

Supposing canals, tanks, wells, and jhils to be utilized to the very utmost and kept in the highest possible order, what extent of the country would be protected from drought in a year when there was a failure of the rain.

I have given 62,000 acres as probably protected by tanks and 37,000 acres as protected from wells in a year when the rainfall had been so short as not to affect the springs for wells, or as to leave the water level in them no higher at the beginning of October than it stood on the 1st May; and similarly as regards tanks. This may be termed a failure of rain.

I have no statistics to guide me, but my impression is that if existing tanks and wells were in the highest possible order, and were utilized to the utmost, my 1-10th (62,000 acres) might be raised to 1-8th (78,000 acres), and my $\frac{1}{4}$ (37,000) to $\frac{1}{3}$ or (49,000 acres).

But if it be desired to know what would be the possible extension of irrigation by State agency or interference on a large scale and with a view to the exigencies at a time of famine, I may add that the railway is now our safeguard so far as it extends, and the practicability of constructing large irrigation

works was gone into in the years 1868-1874 and the subject was probably exhausted. For Chhattisgarh the areas to be irrigated are in the centre of a vast plain, far remote from the points where the deep bedded rivers debouche from the hills into the open country, so that no possible water rates could be expected to pay for the outlay, especially in so thinly inhabited a country. The expense, practically speaking, would be prohibitive, and moreover the rainfall of the country has been generally regular. Droughts have been but few within the period for which we have any accounts. Still, possibly, on a small scale, the waters of the Hasp, the Maniari, the Arpa, Kharod and Lilagarh in Bilaspur and of some hill streams in Raipur might be utilized in irrigation works by storage reservoirs in the hills and distribution channels in the plains.

In the Saugor and Nerbudda territories not only are droughts almost unknown and the soil wonderfully retentive of moisture, and generally not requiring irrigation to support our present population and export a large surplus, but the conformation of the country is such as to render irrigation by canal or reservoir almost impossible, and financially out of question. The case was different in the Nagpur country, where the four most feasible schemes, selected after a careful consideration of the requirements and the configuration of the whole of the Province, were thoroughly elaborated and reported on. The papers which I have consulted are:—

- Note on the value of irrigation in the Nagpur country by the Settlement Officers of the Nagpur, Wardha, and Chanda districts; 5th September 1864.
- Letter No. 1631, dated 28th July 1868, from the Government of India, Public Works Department, Irrigation, to the Chief Commissioner of the Central Provinces.
- No. 8-81 I, dated 28th October 1868, from the Secretary to the Chief Commissioner, Public Works Department, to the Secretary to the Government of India, Public Works Department.
- Report on the Kanhan Irrigation project, dated Nagpur 26th November 1870.
- Report on the Dham Irrigation project, dated Nagpur 14th October 1871.
- Letter No. 5390, dated 25th November 1871, from the Secretary to Chief Commissioner, Public Works Department, to the Inspector General of Irrigation Works.

BERAR.

STATEMENT showing the Proportion of IRRIGATED LAND to UNIRRIGATED LAND in the year 1876.

Districts.	Irrigated.	Unirrigated Land.	Total.	Per-centage of total Land irrigated.
Amraoti	15,686	1,319,616	1,335,302	1.14
Akola	20,731	1,312,286	1,333,017	1.52
Ellichpur	16,443	568,532	584,975	2.81
Buldana	27,634	1,176,860	1,204,494	2.29
Wun	5,379	1,091,302	1,096,681	.49
Basim	15,810	921,707	937,517	1.68
Total	101,688	6,450,393	6,552,081	1.65

From these figures it will be seen that very little land is irrigated in Berar. Irrigation in fact is limited to a small area under rice (about 21,000 acres) and to garden crops. Irrigation is carried on chiefly from wells, although in some cases the water is raised by mōts from the channels of rivers, and a few tanks are made use of. But irrigation is never likely to be generally resorted to in Berar. Our chief crops—jowari and cotton—do not require it.

- Report on the Pench anicut and Ramtek reservoir projects, dated 14th October 1872.
- Letter No. 42 I, dated 24th January 1873, from the Government of India, Public Works Department, Irrigation, to the Chief Commissioner, Central Provinces.
- Letter No. 4031, dated 1st August 1873, from the Secretary to the Chief Commissioner, Public Works Department, to the Secretary to the Government of India, Public Works Department.
- Letter No. 736 I, dated 11th October 1873, from the Government of India, Public Works Department, Irrigation, to the Chief Commissioner, Central Provinces.
- Revised project for the Ramtek reservoir.
- Letter No. 747 I, dated 14th December 1874, from the Government of India, Public Works Department, Irrigation, to the Chief Commissioner, Central Provinces, desiring that no further investigation for such schemes may be undertaken.

The Settlement Officers, however, had to admit that irrigation was not so necessary as in Northern India, and there was considerable doubt whether, if water were brought to their fields, cultivators would use it. Mr. Bernard, C.S., was rather enthusiastic on the subject, and included in his estimates some crops as paying water rates, which probably would not stand irrigation, such as linseed; also jowari, save in extraordinary years, would never require irrigation. The best of the schemes were at last found, on the representation of their warmest supporters, to be financially unsound; and though at one time it was thought worth while to try by actual experiment whether cultivators in these districts would use or would refuse irrigation canal water, it was found that no feasible scheme could be devised which would not involve the outlay of far too large a sum to be experimented with. Our southern wheat harvests are fully six weeks earlier than in the North-Western Provinces, they require irrigation far less, and water could be used for them for a much shorter period. It is doubtful whether cotton is improved in quality by irrigation, and the superior quality of the Hinganghat staple constitutes the foremost element in its market value. I think I may sum up by saying that where canal irrigation would be of importance, nature and cost will not permit of it, and where it could be afforded to the lands, the cultivators would not use it, except in extraordinary years.

CHAP. I. QN. 4.
CENTRAL PROVINCES.
Mr. Nicholls.

BERAR.
Mr. Dunlop.

Colonel Nembhard (late Commissioner of Berar) wrote as follows in 1876:—

"The irrigation is almost entirely from wells. In Amraoti the tank at Karanja is a fine sheet of water, but only five persons used it for irrigation. In the Buldana district, besides the tank at Sindkhed, which irrigates about 50 acres, there is the tank at Fatehkheda, which has recently been restored, and which the Deputy Commissioner says waters a hundred acres, and is likely to prove a remunerative project.

"A good deal of land might be irrigated in the Wun district, but the people will not contribute towards the restoration of tanks. Captain Szczepanski (Deputy Commissioner) says, with water available for irrigation, the people will not use it if they have to pay however little for it. Captain FitzGerald has not mentioned the fine tank at Risod, in the Basim district, which is now a magnificent sheet of water * * *. This project will, I think, prove a success, for the owners of land below it appear to take water readily. Large irrigation schemes in this province must financially prove to be failures, but small projects, such as that at Risod, will, I have no doubt, make a fair return on the outlay."

CHAP. I. QN. 4.
BERRAR.
Mr. Dunlop.

The irrigation of the whole area is dependent on a fair rain-fall. When the rains fail, as they did in 1871, the wells, tanks, and beds of streams dry up in many places. In January 1872 the crop report from the Basim district was that "the fast failing water supply is daily causing serious distress."

Ellichpur.—Major Mackenzie.—The protection is complete over whole irrigated area, so long as the water in the wells lasts. But as the wells depend on a proper rain-fall, if the latter failed, the wells would run dry. Hence protection is not permanent.

Amraoti.—Lieutenant-Colonel Menzies.—Irrigation is scarcely known in the district, which depends almost entirely on the rain-fall, and no portion of the district worth mentioning is protected in an average year by irrigation.

According to the Commissioner's Revenue Report for 1876-77, the following was the extent of land under irrigation, and these are the figures which I adopted, viz. :—

	Rice Land Acres.	Irrigated Land Acres.	Total Acres.
Amraoti - - - - -	1,930	13,756	15,686
Akola - - - - -	508	20,226	20,734
Ellichpur - - - - -	7,810	8,633	16,443
Buldana - - - - -	2,470	25,161	27,631
Wun - - - - -	1,471	3,908	5,379
Basim - - - - -	7,256	8,551	15,807
	21,415	80,241	101,656

Irrigation fell off in 1877-78, and it is possible that Colonel Alexander referred to the returns for that year; but, even if so, his figures do not tally with the Commissioner's, which are as follows :—

AREA under IRRIGATION in 1877-78.

	Rice Land Acres.	Irrigated Land.	Total.
Amraoti - - - - -	1,051	13,431	14,482
Akola - - - - -	890	11,250	12,140
Ellichpur - - - - -	9,030	4,128	13,158
Buldana - - - - -	6,655	9,507	16,162
Wun - - - - -	2,973	2,796	5,769
Basim - - - - -	10,152	8,387	18,539
	30,751	49,499	80,250

Deputy Commissioners have been asked to furnish information regarding the number of wells in their districts, and I hope shortly to receive their reports on this point.

BOMBAY.
Mr. Peile.

The Agricultural Statistical Tables for 1876-77 show the following as the areas under irrigation in each collectorate :—

	Total Area.	Area cultivated.	Under irrigation.	Per-centage of column 4 to column 3.
Guzerat.	Acres.	Acres.	Acres.	
Ahmedabad - - -	1,761,888	895,217	50,300	5.6
Kaira - - - - -	932,378	703,805	56,446	8.0
Broach - - - - -	736,119	401,255	—	—
Surat - - - - -	939,938	404,991	52,627	13
Total Guzerat -	4,370,323	2,405,268	159,393	—
Deccan.				
Khandesh - - -	4,410,426	2,428,936	11,819	0.5
Nasik - - - - -	3,108,781	1,790,630	47,691	2.6
Ahmednagar - - -	3,010,606	2,122,393	37,458	1.8
Poona - - - - -	2,643,464	1,864,475	61,033	3.3
Sholapur - - - -	2,445,783	603,700	54,021	8.1
Satara - - - - -	2,236,107	1,209,453	43,187	3.5
Kaladgi - - - - -	2,154,629	1,095,780	9,786	0.5
Belgaum - - - - -	1,750,227	946,204	17,357	1.8
Dharwar - - - - -	2,042,719	796,695	63,166	8.0
Total Deccan -	23,802,742	13,807,725	345,518	2.5

The figures for Ahmednagar and Kaladgi refer to the year 1875-76, the returns for 1876-77 not having been received yet. Those for Dharwar exclude Savanur and Hebli.

In regard to the blank entries in column headed "under irrigation," against Broach, there appears to be some misunderstanding owing to inaccuracy in the translation of the headings of the column in the Vernacular forms, the words "under irrigation" having been rendered "Land which has been irrigated by means of an aqueduct from dam." There would also appear to be some mistake in the area shown in this column against the Dharwar Collectorate. The area

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assessed as irrigated under the existing tanks in Dharwar exceeds 100,000 acres, whereas the statistical statements show only 63,166 acres as irrigated during 1876-77, including wells.

It is of course possible that the difference is due to the deficient rain-fall of the year, and a comparison with previous years' returns would show this, but unfortunately the returns for 1875-76 were prepared in a different form, and no comparison can be made.

The area under command of our new works in 1876-77 was 206,982 acres. Of this, 132,339 acres are under works drawing their supply from main rivers and streams fed from the Western Ghats, in which the supply during the kharif and early rabi seasons has never been known to fail. The remainder, 74,643 acres, is under works dependent for their supply on the local rain-fall. The following table shows the distribution of this area :—

	Under command of Works having		Total.
	An unfailing Kharif and early Rabi supply.	A supply dependent on Local Rain-fall.	
	Acres.	Acres.	Acres.
Ahmedabad - - -	—	34,068	34,068
Kaira - - - - -	—	9,751	9,751
Surat - - - - -	—	—	—
Broach - - - - -	—	—	—
Khandesh - - -	39,346	584	39,930
Nasik - - - - -	13,336	—	13,336
Ahmednagar - - -	29,408	1,530	30,938
Poona - - - - -	20,955	585	21,540
Sholapur - - - -	—	10,971	10,971
Satara - - - - -	26,827	16,774	43,601
Kaladgi - - - - -	—	—	—
Belgaum - - - - -	—	—	—
Dharwar - - - - -	2,467	350	2,817
Total -	132,339	74,643	206,982

PROTECTION FROM DROUGHT.

The area under command during 1877-78 was 244,137, of which 159,213 was under works having a permanent kharif and early rabi supply.

The Collectors give the following information :—

Kaira.—56,446 acres of Government land are irrigated from tanks, wells, and dhekuries (lift by water bag from river beds). The area in inam villages not known. The supply is not permanent. The Collector thinks that 30,000 acres might be protected in a drought and 11,000 tons of grain produced.

Surat.—52,627 acres under irrigation, all dependent on local rains.

Tanna.—1,779 acres of sugar-cane are irrigated from wells. The principal cultivation of the district is rice dependent on the local rains.

Colaba.—Only a few cocoanut gardens irrigated from wells. Food crops depend on the local rains.

Khandesh.—About 39,000 acres are protected by tanks and canals under the Irrigation Department. Besides, there are the ordinary wells, number not stated. About one-seventieth part of the district is protected by the above means.

Nassich.—47,000 acres are irrigated and assessed as such. The means are canals and anicuts dependent on the local rains, which have been dry for the past two seasons. Besides, there are the wells made by the ryots themselves, not assessed and the number not recorded. No part of the district can yet be said to be effectually protected. The produce grown by irrigation is sugar-cane, ground-nuts, vegetables, wheat, and gram.

Ahmednagar.—There are three great irrigation works—(1) the Lakh Canal, (2) the Ojhar Canal, (3) the Bhutodi Tank. Besides, there are the ryots' wells. The ruins of many small bandharas not in use are visible, and bandharas might be constructed on the Godaveri, Sina, Mula, and Bhima rivers.

Poona.—Besides the works of the Irrigation Department, 62,000 acres are irrigated from wells, nullahs and tanks dependent on the local rain. If it fails, they dry up. It is impossible to say how far they would protect the above area in a year of drought.

Sholapur.—1,500 wells protect incompletely 50,000 acres, but most of them will last through one year of insufficient rain-fall. The Ekrak tank is under the Irrigation Department.

Kaladgi.—About 9,000 acres are irrigated from tanks and wells dependent on the local rain. About 2,000 acres are devoted to food crops proper, the rest to sugar-cane, chillies, and vegetables. Compared with the area of the district, this is a mere trifle. In 1876-77, by aid of kutchha wells, the irrigated area was increased to 18,667 acres.

Canara.—There are no irrigation works, and the area protected by wells, &c. is inappreciable.

The question is then asked, (Q. 4) what area in Bombay is protected from drought in an average year by irrigation from wells, tanks, or canals?

The case of each province under Bombay as they come in order from north to south, is as follows :—

Sind is protected by the Indus inundation, which takes place every autumn.

Kutch is unprotected by rivers or canals, and wells are not numerous, the subsoil being salt. But it has a large trade and is very accessible, and the people are rich. The responsibility for famine relief rests on the native ruler.

Kattywar has no canals or large irrigation works at present. But it has an excellent water supply through wells. In 1877 upwards of 10,000 new wells were dug. Attention is now being given to irrigation works. The responsibility for famine relief rests on the native rulers.

Guzerat is liable to famine or scarcity, though no severe famine has occurred since A.D. 1813. It is rich and in many parts could withstand one year's famine. Irrigation canals are under construction in Ahmedabad and Surat.

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Mr. Peile.

The Concan does not admit of irrigational works, nor require them. The rain-fall on the coast is almost invariably heavy. There is no famine recorded, though local scarcity occurs.

The Deccan.—The tract immediately east of the Ghats is as safe as the Concan. The tract further east up to the frontiers is not safe and is that which requires protection, and for which irrigational works are under execution.

The protection now existing may be divided thus :—

- Protection by tanks and wells made by the people.
- Protection by large irrigation works under the P. W. D.

The area protected by large works under the Irrigation Department is shown in the following table :—

	Under command of Works having		Total.
	An unfailing Kharif and early Rabi supply.	A supply dependent on Local Rain-fall.	
Ahmedabad - - -	—	34,068	34,068
Kaira - - - - -	—	9,751	9,751
Surat - - - - -	—	—	—
Broach - - - - -	—	—	—
Khandesh - - -	39,346	584	39,930
Nasik - - - - -	13,336	—	13,336
Ahmednagar - - -	29,408	1,530	30,938
Poona - - - - -	20,955	585	21,540
Sholapur - - - -	—	10,971	10,971
Satara - - - - -	26,827	16,774	43,601
Kaladgi - - - - -	—	—	—
Belgaum - - - - -	—	—	—
Dharwar - - - - -	2,467	350	2,817
Total -	132,339	74,643	206,982

These works will, when completed, command 352,029 acres. The area actually irrigated in 1876-77 was 22,801 acres. The whole commanded area is a little over two per cent. of the total area of the Deccan: when the works are completed it will be not quite three per cent. of the total area. On the cultivated* area as given in the above table by Mr. Hughes, the area commanded by irrigation is now 3½ per cent., and will, when the works are completed, be 5 per cent.

The country is not very favourable for the construction of large irrigation works, and the success of those already constructed is not great, as may be judged by the following results of eleven years' working of the Jamda Canal in Khandesh (1866-77) :—

Receipts.	Working Expenses.	Loss.	Interest on Capital.
Rs.	Rs.	Rs.	Rs.
22,314	1,07,058	84,744	3,90,172

This is due to the disinclination of the people to take the water. It is entirely optional to use it or not, and no water advantage rate is charged on land accessible to canal water. An attempt to charge certain inam holders in Kaira for improved water supply was abandoned on their filing suits against the Collector. But legislation is now about to be resorted to.

It is clear that in some parts of the Deccan canals are urgently required as a relief from drought. For instance in the drought-stricken tracts of Indapur and Bhimthari in Poona, where the cultivator can rely on

* Note.—The area is 16,654,420 acres in the official reports for 1875-76.

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two bad seasons out of three and the average rainfall for several years was under six inches. This tract will be protected by the Neera Canal, a work included in the list of large works designed by the Bombay Government for the protection of the dry zone of the Eastern Deccan and estimated to irrigate over 2,000,000 acres. The Gokak Canal in Belgaum is a similar work, protecting a tract of irregular and short rain-fall, where the average gauged in 18 years was 14·16 inches. Both these works and many others, of which a clear view can be obtained from the irrigation chart, were commenced as famine works in the dry zone of the Deccan between Khandesh and Dharwar. Their completion will depend on the possibility of supplying funds from the public revenues or from loans.

Equal attention does not appear to have been given to the subject of well irrigation. There has been no hydrographic survey of the Deccan to ascertain the position and capacity of the water-bearing strata with a view to wells. It would be valuable both to the people and Government to know the truth. Where wells are impracticable, water must be brought from a distance in canals. Where wells are easy and cheap of construction, canals may not be needed, or not in equal degree. A fairly good well will outlast one year of drought. It is clear that well irrigation is very scanty, and it should be known whether this is owing to the absence of natural resources or to the neglect of them. Well irrigation appears to be the best antidote to scarcity of the minor class, and especially is a preserver of the plough cattle in time of drought.

MADRAS.

The Board of Revenue.

What area of your Province and of its several districts is protected from drought in an average year by irrigation from wells, tanks or jhils, or canals or channels from rivers?

Information regarding the irrigated area in this Presidency is not complete, as no particulars are available as to the acreage under private sources of irrigation. Collectors were asked to collect the information, but several of them have reported that it would not be possible to procure any reliable particulars within the time allowed. As it is very important, however, that the information should be collected, if possible, the Board have again urged upon Collectors the necessity of using their best endeavours to obtain it, and it may perhaps be available at a future date. The difficulty of obtaining any statistics with regard to zamindari tracts is very great, as has been explained in reply to Question 3. The following statement shows the average area irrigated from Government sources in each district or charged as irrigated during the years 1874-75 and 1875-76 :—

Districts.	Irrigated Area of Ryotwari Lands.	Irrigated Area of Zemindari and Inam Lands.	Total.
Ganjam	181,241	112,987	294,228
Vizagapatam	48,728	118,058	166,786
Godavari	325,114	314,203	639,317
Kistna	192,975	91,965	284,940
Nellore	178,503	60,331	238,834
Cuddapah	116,231	128,198	244,429
Bellary	124,851	55,245	179,094
Kurnool	36,356	22,144	58,500
Chingleput	296,437	91,189	387,626
North Arcot	234,906	51,512	286,418
South Arcot	362,316	36,871	399,187
Tanjore	782,969	164,547	947,516
Trichinopoly	183,697	23,900	207,597
Madura	151,710	29,647	181,357
Tinnevely	177,410	27,164	204,574
Coimbatore	92,825	11,168	103,993
Nilgiri	40	—	40
Salem	93,422	17,191	110,613
Malabar	387,024	811	387,835
Total	3,906,755	1,356,129	5,262,884

There is no information in the Board's Office with regard to the total irrigated area under each class of work such as tanks, canals, &c., and the figures furnished by the Collectors are incomplete. A statement, however, is given on page 49 showing the number of the several kinds of works irrigating Ryotwari lands.

To how much of the area is the protection complete and permanent, and how much is dependent on the local rain?

The whole of the irrigated area in the districts of Ganjam, Vizagapatam, Bellary, Madura, and Salem depends on local rain, and no portion of it can be considered completely and permanently protected. As regards Vizagapatam, however, the Collector states that cultivation depends upon the south-west monsoon, which never entirely fails in this district. Cuddapah

MADRAS.

and Kurnool also are practically dependent entirely on the local rains, the area irrigated by the Madras Irrigation Company's canal being very small, although during the late drought there was a considerable extension of irrigated area under this work. The area under the Pennar channels in Nellore, under the Palar anicut in North Arcot, and to a great extent the area under the Madhurantakam, Utramurur, Red Hills and Sholavaram tanks and the Palar channels in Chingleput, under the Cauvery and Bhavani channels in Coimbatore, the lands irrigated by the Cauvery channels to the breadth of a mile and a half on each side of the river in the Trichinopoly district, and under the Coleroon channels in South Arcot may be considered protected, but the area is too small to have much effect in the way of keeping these districts free from famine. The portions of the Presidency which enjoy almost complete immunity from famine owing to never failing and efficient irrigation are the deltas of the Godavari, the Kistna and the Cauvery in the Godavari, Kistna, and Tanjore districts, and the lands irrigated by the Tamrapurni in Tinnevely. The subjoined table shows the estimated area under irrigation in the Presidency which may be regarded as really protected from drought. The figures are based on the area irrigated in 1875-76, an unfavourable year :—

Districts.	Name of the Irrigation System.	Area Irrigated.
		Acre.
1. Godavari	Godavari delta works	530,579
2. Kistna	Kistna	235,348
3. Tanjore	Cauvery	820,531
4. Tinnevely	Tamrapurni Channels	105,263
5. South Arcot	Coleroon Channels	71,232
6. Trichinopoly	Cauvery Channels	73,648
7. Nellore	Pennar Anicut	53,957
8. Coimbatore	Bhavani and Cauvery Channels	33,661
9. North Arcot	Palar Anicut	20,136
10. Chingleput	Palar Channels Madhurantakam, Utramurur, Red Hills and Sholavaram Tanks.	36,210
11. Cuddapah	Madras Irrigation Company's Canal	16,054
12. Kurnool	do. do.	71,301
	Total	2,963,020

The whole area of cultivation under wells, of which there are more than 375,000 in the Ryotwari portions of the Presidency, cannot be said to be completely and permanently protected from long-continued drought. During the late famine many of the wells completely failed, but there can be no doubt that even such wells are of great service when the drought is only partial

PROTECTION FROM DROUGHT.

and of short duration. The board have no information as to the actual area under well irrigation.

For reasons already explained, the protected area under private sources of irrigation in Zamindaris is unknown, but it may be generally asserted that it can be of no very great extent, as all the large rivers are under the control of Government, while tanks and the larger class of irrigation works do not as a rule receive much attention in Zamindaris. In some districts, however, as for instance Vizagapatam and Nellore, the effect of this neglect on the part of the landowners has been to give a stimulus to the sinking of wells by the tenants, and thus, though a smaller area is protected, the nature of the protection is more efficient in times of serious drought.

How much of the area so protected is devoted to food grains, and what is the total amount of produce from that area?

The only crops other than food-crops which are usually irrigated are tobacco, sugar-cane, betel, plantains, turmeric, onions, and garlic. These are generally cultivated with the aid of wells, and bear but an insignificant proportion to the entire cultivation, that for the whole Presidency being not so much as 2 per cent. For all practical purposes the whole of the protected area may be regarded as being under rice. The out-turn calculated at the rates assumed in reply to Question 3 will be as follows :—

Districts.	Out-turn in Tons of Rice, including 2nd Crop.
1. Godavari	307,271
2. Kistna	141,104
3. Tanjore	482,297
4. Tinnevely	59,659
5. South Arcot	38,378
6. Trichinopoly	36,792
7. Nellore	25,969
8. Coimbatore	17,537
9. North Arcot	15,416
10. Chingleput	13,709
11. Cuddapah	10,827
12. Kurnool	45,157
Total	1,194,116

The out-turn will be sufficient to feed only 19 per cent., or nearly $\frac{1}{5}$ th of the population of the Presidency.

What is the effect of irrigation of crops other than food-crops in adding to the powers of the population to resist famine?

The irrigated crops other than food-crops are very remunerative, but, as already observed, they bear but an insignificant proportion to the total cultivation, and thus cannot be considered to have any very appreciable effect in adding to the power of the population generally, to resist famine. There is, however, no doubt that the particular ryots engaged in such cultivation are more than usually well-to-do.

Supposing canals, tanks, wells, and jhils to be utilized to the utmost extent and kept in the highest possible order, what extent of country would be protected from drought when there was a failure of rain?

Any reply to this question must be to a great extent conjectural. The opinions of Collectors as to the present state of irrigation works, and as to the extent of country which would be protected from drought if they were maintained in the highest state of efficiency, will be found in detail in the appendix. The replies go to show that, while a fair amount of attention is being paid to the larger irrigation works, the smaller ones are comparatively neglected. The question was fully considered by the Public Works Commission of 1869. No amount of attention paid to these works will secure the area under them from

drought when there is complete failure of rain, but it is of the highest importance that they should be maintained in good order, to enable them to hold out against the partial droughts which so often occur. With regard to the extension of protected area the Collector of Godavari states that in that district it can be increased from 560,000 to 600,000 acres, if improvements to the delta works are carried out. None of the other Collectors allude to any works by which the protected area might be increased.

In the above consideration of this question, which relates to the area of the Presidency protected by irrigation, the two West Coast districts of Malabar and South Canara have been excluded, as there is in these districts little or no irrigation properly so called. They depend upon the south-west monsoon, which has never been known to fail to any large extent, and the first crops are matured almost entirely by the direct action of the rainfall. The following extracts from the reports of the Collectors explain clearly to what extent irrigation works are made use of :—

Mr. Logan writes of Malabar : "As the Board are no doubt aware, artificial irrigation in the sense in which these words are understood elsewhere has scarcely any existence here. And yet the district has a very large breadth of land under wet crops. Every valley in fact is a paddy-field depending for irrigation on the stream which flows down it. Except in the case of large streams, the usual plan is to construct an artificial channel either down the middle of the irrigated fields, if the stream is very small, or one or the other or both sides of the valley, if the water supply is plentiful, on such levels as serve both the purposes of irrigation and of drainage.

"Where the stream is large the volume of water coming down in the monsoon season is so enormous as to be perfectly unmanageable for any purposes of cultivation. The rich alluvial lands on the banks are irrigated from the smaller streams falling into the larger one, and the surplus water is drained off into the main stream. Towards the end of the season a few temporary bunds are thrown across some of the minor streams, while in parts of Palghat Taluk some water is stored during the rainy season in a few small bathing tanks, and let out into the fields under them while the second crop is on the ground. The area thus irrigated by storage of water is, however, comparatively insignificant.

"The only works in the district which are classed as irrigation works are dams constructed at convenient points for intercepting drainage and for preventing the flux of salt water. The cultivation dependent on these irrigation dams lies above the works and not below them as usual elsewhere. The rice crop then depends almost exclusively on the monsoon rains, and these have fortunately never been hitherto known to fail entirely."

Mr. Comyn, the Collector of South Canara, states : "Cultivation in this district is mainly dependent on the falling rains. This is especially the case as regards the first rice crop, locally termed 'Yenel,' which is sown in June and reaped in September or beginning of October, and which therefore gets the full benefit of the south-west monsoon.

"The second rice crop, called 'Suggi,' is sown in October and reaped in February. This crop receives benefit from occasional showers after the heavy monsoon rains have ceased, but is chiefly dependent and is brought to maturity by irrigation from small rain-fed tanks or wells, or more generally channels, rivers, or rivulets, which taking their source from the forest-clad slopes of the ghât range, running along almost the whole eastern border of the district, or springing independently from isolated jungle-clothed hills, are more or less perennial. Where flow is scanty, or the lands to be irrigated are high, the necessary supply of water is obtained by the construction of temporary dams thrown up at intervals across the streams, and channels are raised by means of picottahs. The dams and picottahs are constructed and maintained by the ryots themselves without any aid from the State,

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except in a few cases in which a customary 'Kuttutar Inam,' or remission, is allowed for raising bunds. "The third rice crop, called 'Kolaké,' is sown in February and reaped in May (in high lands pulses are often grown in lieu of rice). This crop is almost entirely dependent on irrigation from the sources above described, but is also benefited by the early spring showers. In case of complete failure of rain in a single season—an event happily unknown in Canara—these irrigation sources would run dry, so that it may be said that practically the whole of the cultivated area of the district is dependent on the local rain-fall extending from the coast up to the crest of the furthest ghât water sheds.

* * * *

"There are no Government irrigation works, and no account of the extent of land cultivated under each of the private sources of irrigation is kept in the district which has not been surveyed. These petty irrigation works are mostly of a temporary nature, and are kept up from time to time by the ryots. Even if kept in thorough repair they would be of no avail in case of failure of rain."

The whole of Malabar and South Canara may thus be considered as completely protected from drought, though the protection is not due to any appreciable extent to irrigation works. Taking the out-turn of food grains in these two districts into account, the total out-turn of the protected area of the whole Presidency will suffice to feed 24 per cent., or about one-fourth of the population.

APPENDIX A.

STATEMENT showing the Number of Irrigation Works in the Ryotwari portions of the Presidency.

Districts.	Tanks.				River Channels.				Spring Channels.				Anicuts.				Wells.							Remarks.
	Government.	Private.	Dasabundum.	Total.	Government.	Private.	Dasabundum.	Total.	Government.	Private.	Dasabundum.	Total.	Government.	Private.	Dasabundum.	Total.	Government.	Private.			Dasabundum.	Total.		
																		Old.	New.	Total.				
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
Ganjam	1,822	83	—	1,905	302	1	—	303	163	—	—	163	4	—	—	4	—	229	1	230	—	230	Dasabundum works are repaired by private individuals who enjoy Inams for doing this duty	
Vizagapatam	435	146	—	581	111	—	—	111	17	—	—	17	2	—	—	2	—	63	597	660	—	660		
Godavari	1,080	147	—	1,227	39	1	—	40	22	—	—	22	—	—	—	—	7	723	74	797	—	804		
Kistna	370	111	17	498	649	—	—	649	59	1,196	—	1,255	27	2	1	30	57	2,011	1,141	3,152	2	3,211		
Nellore	658	98	11	767	71	7	—	78	88	176	6	270	53	23	—	82	625	9,175	945	10,120	—	10,745		
Cuddapah	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	43,065		
Bellary	847	212	150	1,209	261	26	4	291	1,075	477	4	1,556	144	11	1	156	9,743	4,675	6,330	11,005	251	20,999		
Kurnool	341	83	67	491	33	4	—	37	190	40	—	230	23	6	9	38	2,099	3,165	2,010	5,175	32	7,306		
Madras	8	—	—	8	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
Chingleput	1,310	21	1	1,332	70	—	—	70	83	25	—	108	19	2	—	21	54	5,761	3,315	9,076	—	9,130		
North Arcot	1,933	132	806	2,871	420	19	52	491	384	54	27	465	131	3	9	143	—	47,163	5,327	52,490	164	52,654		
South Arcot	2,671	376	—	3,047	867	11	—	878	154	16	—	170	141	3	—	144	—	37,998	13,470	51,468	—	51,468		
Tanjore	592	90	—	691	2,944	1,492	—	4,436	34	11	—	45	134	42	—	176	—	11,864	105	11,969	—	11,969		
Trichinopoly	815	502	—	1,317	671	61	—	732	3	6	—	9	75	10	—	85	9,658	4,024	1,900	5,924	—	15,582		
Madura	2,156	2,841	—	4,997	297	297	—	594	24	5	—	29	190	151	—	341	—	15,143	9,031	24,174	—	24,174		
Tinnevely	2,084	122	—	2,206	164	1	—	165	62	34	—	96	131	5	—	136	—	12,498	15,931	28,429	—	28,429		
Coimbatore	135	17	4	156	90	1	—	91	34	56	—	90	83	29	—	112	34	38,091	9,500	47,591	—	47,625		
Nilgiri	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
Salem	1,360	500	150	2,010	333	2	3	344	125	14	—	139	334	58	6	398	14,244	29,841	3,396	33,237	—	47,481		
South Canara	—	—	—	—	160	73	13	246	370	376	36	782	—	—	—	—	—	2,352	360	2,712	2	2,714		
Malabar	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		
Total	18,617	5,490	1,206	25,313	7,497	1,990	72	9,565	2,887	2,486	73	5,446	1,491	351	26	1,868	36,521	224,776	73,433	298,209	451	378,246		

RAJPUTANA.

RAJPUTANA.

Alwar.—*Captain Law*.—I understand this question to be, what is the total area of the irrigated land? If so, the answer is, 122,510 acres, or somewhat less than one-eighth of the whole area of the State (*vide* reply to Question 3). The whole of this area is dependent on local rain.

There are no records to show the exact area of irrigated land sown with food grains; but it is roughly estimated that it is about 107,500 acres. The total produce, at the average rate of 22½ maunds the acre, would be about 1,996,677.

Dholpur.—*Lieutenant-Colonel Dennehy*.—The total area of the State is 763,462 acres.

Of this, 262,569 acres, or 38·3 per cent., are cultivated, and 124,432 acres, or 16·2 per cent. more are culturable and are being gradually brought under cultivation.

Of the cultivated area 69,833 acres, or 26·5 per cent., are irrigated.

36,935 acres, or 52·8 per cent. of the irrigated land is "dofasi," that is to say, it bears a double or in some instances a treble crop each year.

The greater portion of the irrigated land is watered by wells; 2·5 per cent. only is watered from tanks.

Considerable efforts have been made since 1874 to increase the area thus partially protected, and within the last four years 33 new tanks and 400 new wells have been constructed at the expense of the State.

The average amount produced per acre is:

Of wheat	-	-	-	25	maunds.
Of barley	-	-	-	30	do.
Of gram	-	-	-	12	do.
Of bajra	-	-	-	10	do.
Of joar	-	-	-	10	do.
Of urd	-	-	-	7	do.

Of mote - - - 10 maunds.
Of arhar - - - 12½ do.

The total consumption of the State is per annum about 1,727,500 maunds, and a surplus of about 1,501,866 maunds, chiefly of wheat, barley, and gram, remains for export.

The more valuable crops are generally limited to the field close to the village site, to which also generally the means of irrigation are confined, and on which the manure procurable in the village can more readily be made available.

The superior kinds of crops, such as wheat, joar, &c. &c., and certain of the good miscellaneous crops, occupy only 33 per cent. of the cultivation, whereas the inferior grains, bajra, mote, bejhar, gram, and barley (both of which last in ordinary years are decidedly inferior) cover 67 per cent.

Kotah.—*Major P. W. Poulett*.—I have not exact statistics of the area in Kotah protected from drought by irrigation; but a year ago I obtained approximate statistics, and ascertained that it did not exceed 5 per cent. of the total area. Nor should I imagine that this proportion was exceeded elsewhere in Haroti. Rain crops so seldom fail ruinously, that there is unusually little temptation to construct wells; and tanks watering much land are few and far between.

Of 480 bighas of well land, being the irrigated of three villages, 257 or 53·5 per cent. were under food crops.

There are a considerable number of wells out of repair; and in some localities new wells can be cheaply made. When the total failure of the rains was threatened in August 1877, I reckoned on being able with exertion to add 300 to the number of working wells in Kotah in time for the rabi sowings.

Bhartpur.—*Mr. L. D. Spencer*.—The total area irrigated from wells amounts to 304,370-1¼ bighas. The number of wells is as follows: masonry 9,696, mud 4,042 = 13,738. A well would thus irrigate 23 bighas of land. There are 113 dams, jhils, &c., which are calculated to irrigate 272,120 bighas. The area dependent directly on rain is 1,111,664 bighas; the total of culturable land is 1,692,892 bighas. With regard to the area watered by wells, a well which in ordinary years irrigates 20 to 25 bighas will in a year of drought irrigate 10 to 12 only; that is, its irrigating capacity will have been impaired by one half. If then the yield of 1½ lakhs of bighas be calculated at five maunds per bigha, the total out-turn would amount to 750,000 maunds, which in a year of famine is enough to feed one-sixth of the whole population.

Dr. Moore.—The area of the province protected from draught by wells, tanks, or jhils, canals or channels from rivers cannot be given. Except for a short distance in the most North-western State, Bhurtore, there is no canal irrigation. In Ajmere and Mhairwarrah, and many other places, there are numerous tanks, the country being hilly, and well adapted for the formation of tanks. All the other cultivation, except rain-crops, is from wells. But it may be broadly stated that the whole of the cultivation is dependent on rain, as many wells run dry after a failure of the monsoon. Therefore, under such circumstances, but a small portion of the country could be protected from drought; although, with a larger number of wells, the country would be placed in a much better condition to combat with famine. In Bickaneer and the semi-desert districts the wells are very deep. Sometimes the water is as far as 300 feet or even 500 feet from the surface, and irrigation is scarcely practical, and certainly not remunerative at much more than 70 feet from the surface. In these parts the people are therefore almost entirely dependent on rain-crops, bajri being the grain growing with most luxuriance in the sandy soil. Water at Bickaneer is only obtainable at 300 or 400 feet from the surface. I investigated the material brought up from a well where water had been found at a depth of 316 feet. This well was within the city walls of Bickaneer at the south-west extremity. The

strata passed through was first a mass of kunkur; then a mass of "Multani mutti" or red clay; thirdly, sandstone; and lastly, white gritty sand or gravel; the latter consisting of white stones from the size of a pea to that of an egg, composed of quartz, and although not round, yet with surfaces and angles so smooth as to give rise to the idea that they must at some time have been exposed to the action of water. Carter, the geologist, has, I believe, expressed his opinion that the whole of this semi-desert portion of Western Rajputana did at some remote period form the bed of an ocean, extending from the present shores of the sea to the line of the Aravelli range, which has already been described as in its southern aspect rising like a wall from the Marwar plains below. And the geological characteristics shown to exist by the deep wells of Bickaneer would seem to support this view. On this point I may observe that I found an unmistakable fossil shell mark on a stone of the wall of the old fort of Bickaneer, built by Bickajee in Sumbut 1545, or about the year A.D. 1484. Although no companion marks were seen on other stones, yet a more minute and scientific search than I could afford would probably prove successful. At the village of Nokha, about half-way between Bickaneer and Nagore, is a well 400 feet deep, and only three and a half feet at the mouth. Water from this well, when drawn, was quite hot. No one seemed to have any clear idea when the well was made, and no one knew why this particular spot was fixed upon for sinking a well. In other places the one village well is generally in a hollow or depression between the "Teeburs" or sand hills, where it would be reasonable to expect water nearer the surface. But Nokha is on a flat site, rather elevated above the surrounding sandy wastes, the ground being harder, and not at all the locality where water would be sought for at that depth, with the confident expectation of reward for the labour. It was stated no one attempts to sink such wells now. During the stay of the camp at Nokha, men were sent down to clear the bottom, so that a better supply of water might be obtained. The shaft being so narrow, and not faced with masonry, the cleansing process is rather a tedious business. First, a basket is let down, and then a man: he fills the basket at the bottom of the well; he is then drawn up, and afterwards the basket with its contents; and so on, till the well is cleared out. The material brought up was sandy mud, having the usual earthy odour. The water allowed to clear was fairly good, but hard from excess of lime. We let a lighted candle down this well, but the glimmer was lost long before it arrived at the bottom. I may here mention that, although the wells are so deep, the people suffer considerably from "guinea-worm," proving that the young of the guinea-worm cannot there, at least, be bred in the slimy ooze collecting on the steps of tanks, or in the neighbourhood of dipping wells, and so finding entrance into the legs of those frequenting such places, as has, with some plausibility, been theorised.

Ajmir.—*Mr. L. S. Saunders*.—This is a difficult question to answer. The large lakes are those only that hold water in times of drought, and possibly 10,000 acres alone could be sure of direct irrigation from them, with 13,000 acres in the bed of tanks which remains moist enough for cultivation; add 25,000 acres from wells, which would give 48,000 or say 50,000 acres in round figures as protected in all ordinary years of drought; if, however, these large lakes were to dry up, the springs in the wells would suffer, and probably this figure might be halved. In the Istimrar portion of the district nearly the same proportion may be set down as protected.

The Istimrar cultivation is set down roughly at 643 square miles = 411,520 acres, so that if we calculate a lac of acres as protected fairly in the whole district in all years (except these of extreme and quite exceptional drought) I believe we may consider our statistics fairly accurate.

CENTRAL INDIA.

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CENTRAL
INDIA.

Mr. Wingate.

Irrigation is very limited. In Baghelkhand Lieutenant-Colonel Bannerman says a few Kachees water vegetables from kucha wells, but even this is rare. In W. Malwa there are no large tanks, and irrigation by river or canal is impossible; but wells are used. In Bhopal and Rutlam, about one-tenth of the land under cultivation is described as "protected" by

wells, jhils, tanks, and dams or nullas, though all these are more or less dependent on the rain-fall. Mir Shahamat Ali says the nullas always have enough water for the opium season. Opium, sugar-cane, and vegetables are the crops irrigated, and of the first nearly every cultivator grows a little.

HYDERABAD.

Moulvie
Mahdi Ali.

The tabular statement given below will, with certain explanations that follow, afford a fair view of the extent under irrigation from the year 1280 to 1287 Fusli (1870 to 1877):—

Years.	Telingana.	Maratwari.	Total protected.
	Acres.	Acres.	Acres.
1280	155,073	135,647	290,720
1281	170,960	153,241	324,201
1282	290,934	177,219	468,153
1283	253,367	181,681	440,048
1284	338,095	176,260	514,355
1285	234,496	142,818	377,314
1286	168,912	133,821	302,733
1287	199,363	144,553	343,916
Average	229,526	156,280	385,806

Out of the years above enumerated, 1284 Fusli was, for Telingana, a very good year, 1280 an unfavourable one, while 1283 was an average year with regard to rain-fall. The area irrigated in that year may therefore be taken as that protected from drought in an average year.

The proportions of the several districts protected from drought in the years 1285, 1286, and 1287 Fusli by means of irrigation from wells, nullas, rivers, and tanks are stated below:—

TELINGANA.				
	1285.	1286.	1287.	
Wells	48'55	61'06	50'25	
Nullas	7'44	4'02	4'45	
Rivers	0'64	0'86	0'60	
Tanks	43'37	20'56	35'61	
Total	100	100	100	

MARATWARI.				
	1285.	1286.	1287.	
Wells	84'02	84'13	84'06	
Nullas	4'22	4'22	3'85	
Rivers	1'81	1'78	1'74	
Tanks	9'05	9'82	9'75	
Total	100	100	100	

But, in order to get at the correct figures, the area in Telingana should be increased by 50 per cent.—25 per cent. to cover the difference between the correct area and the area entered in Patwari's records, from which the figures in the above statement have been taken, and 25 per cent. for double-cropped area—so

HYDERABAD.

that the total irrigated area may be taken as equivalent to 375,000 acres.

In Maratwari the area irrigated in 1285 Fusli (1875-76) should be increased by about 20 per cent. to obtain the correct figures, or may be taken as equivalent to 175,000 acres.

To how much of this area is the protection complete or permanent, and how much is dependent on the local rain?

The area given for the Mahratta country may be considered as completely protected, as irrigation is there carried on by means of wells, which are seldom or never exhausted in one season of drought. Of the area given for the Telingana districts, 180,000 acres (a little less than one-half) are completely protected by means of well irrigation, while the remaining area is protected by tanks and channels which are entirely dependent for their supply on the local rains. But if there be good rain-fall one year and the tanks are filled, they will then supply water for irrigation the following year, though that season may be one of scanty rain-fall.

How much of the area so protected is devoted to food crops, and what is the total amount of produce from that area?

With the exception of a very small area devoted to vegetables, sugar-cane, tobacco, opium, &c., it is food crops that are chiefly grown on irrigated lands. In the Mahratta districts, of the 175,000 acres mentioned above, half the area may be said to be devoted to wheat cultivation, the produce of which may be estimated at about 875,000 maunds (at 10 maunds* or 820 lbs. per acre); one-fourth of the area may be said to be devoted to gram and jowari crops, yielding about 437,500 maunds (at 10 maunds per acre); and in the remainder one-fourth vegetables, opium, and sugar-cane may be said to be grown.

In the Telingana country, of the 375,000 acres mentioned above, 10,000 acres only may be said to be devoted to vegetables, &c., the rest (365,000 acres) to paddy (rice) cultivation. The produce from this area may be estimated at about 10,950,000 maunds (391,071 tons) of paddy at 30 maunds (2,460 lbs.) per acre.

Supposing canals, tanks, wells, and jhils to be utilized to the utmost extent, and kept in the highest possible order, what extent of the country would be protected from drought in a year when there was a failure of the rain?

In the Mahratta country there are about 63,576 wells, of which 48,632 are in use and 14,944 are out of repair. If the latter were put in repair,† these,

* The estimated produce of wheat from one acre of dry land is five maunds, while from one acre of wet land at least 10 maunds.

† Government is not expected to be under the necessity of taking any steps towards repairing these wells, as on the introduction of the Revenue Survey, when a 30 years' settlement is made, the ryots will, it is expected, take to improving their property by repairing these wells or sinking new ones; in fact they have already begun doing so during the last five years.

together with those already in good working condition, would protect from drought more than 300,000 acres of land at the rate of five acres per well, which would yield 3,000,000 maunds, or 107,142 tons of grain. Now, at the rate of 1½ lb. of grain per head per day, 6 maunds 34 seers would support an adult through the year, or 6,850 maunds (244½ tons) would support 1,000 adults throughout the year. A population of about 432,000 souls, roughly speaking, could therefore be supported in a year of drought on the produce of land thus irrigated in the Mahratta country.

In the Telingana districts there are in all about 52,685 wells, of which 33,851 are in use, and about 18,834 are out of repair. If these were put in repair an area of about 210,740 acres (at the rate of four acres per well) would in like manner be completely protected in a season of drought. This area would, on an average, yield about 622,200 maunds, or 225,792 tons of grain, which would support a population of about 91,000.* There are about 18,089 large tanks in Telingana, of which 4,924 are in use and about

* N.B.—There is some error in this calculation. 210,000 acres at 10 maunds per acre, will produce 75,000 tons of rice and feed 300,000 people.—C. A. E.

3,165 are out of repair.* Besides these, there are about 10,110 small tanks, of which 5,616 are in use and 4,494 are out of repair. If these were put in thorough repair (some millions of rupees would be required to do this) about 1,000,000 acres of land would be irrigated. But, as has been remarked above, these tanks depend upon the rains for their supply.†

* The Government, at its own cost, repairs all the existing tanks. So many of the old tanks are out of repair that it is found more to the purpose to repair them than to construct new ones. In repairing old tanks and making new ones nearly 20 lakhs of rupees (173,913l.) have been spent between 1277 and 1286 Fusli (1867-76), vide Statement E. hereunto attached. From this statement it will be observed that in the construction and repair of tanks, channels, and wells, Rs. 37,77,573 were spent between the years 1277 (1867-68) and 1286 Fusli (1876-77).

† To afford facilities for the repair of tanks a new scheme has been formulated, by which the Revenue Officers are empowered to spend annually up to two lakhs in petty repairs of tanks; the Public Works Department carry out the chief repairs, estimates for which have first to be submitted for approval to the Revenue Minister. By the new scheme in question a sum of from five to seven lakhs annually will be probably set aside for irrigation purposes. For 1289 Fusli upwards of seven lakhs of rupees have been sanctioned for the purpose.

‡ But as there are two permanent rivers, the Godavery and the Manjra, flowing through Telingana, many of the tanks can be easily connected and fed by them by running artificial watercourses, and this will afford permanent protection to an extensive area. This subject is under the consideration of Government.

CHAPTER I.—QUESTION 5.

What grains form the staple food of your people? When are they sown and harvested, and what are the critical times at which rain is essential to each of them, or at which a failure or excessive fall of rain may be mischievous or ruinous?

PUNJAB.

The replies of district officers and the table calculated from them, which is appended to question 3, show that barley and the kharif millets and maize, with a little rice, form 47 per cent. or nearly half the food consumed in the province, that wheat contributes thereto 37 per cent, and pulses 15 per cent. In the Gurgáon District and Hissar Division the agriculturists do not consume any wheat; but in the Lahore districts and in the Ráwalpindi and Mooltan divisions wheat forms half of the food annually consumed by the population.

On the whole the replies received show that the two harvests contribute equally to the food of the population.

The rabi harvest being sown in September and October, it is absolutely necessary that there should be rain in one of those two months, or it will not be possible to sow successfully. Similarly, showers are necessary at the end of December or beginning of January, and again in February, and if none fall in these months the unirrigated crops necessarily fail. These winter rains almost certainly fall in sufficient quantity sooner or later. Heavy rain in March and April, when the crops are ripening, is not uncommon,

promoting rust and blight and otherwise injuring the quality of both grain and straw. The rabi crops in the north of the province ripen nearly a month or three weeks later than those in the south, where the summer heat sets in perceptibly earlier.

As regards the kharif, owing to the great heat of the summer and autumn, it depends throughout for its success on the repetition of rain at short intervals of, say, a fortnight each. If a month's break occurs in the rains, the crop is much jeopardised by its continued exposure to fierce drying heat; though even after such an interval, the crops frequently show a wonderful power of recovering themselves when rain does fall. This crop is rarely materially injured by undue prolongation of the rains beyond their usual season.

I shall not attempt here to indicate the different peculiarities of the several crops. The pulses, especially gram, are more delicate than the cereals, being easily injured by too much rain. And of all the crops, wheat, which occupies the ground the longest, seems to be the sturdiest and least fickle, as it is also the most paying.

DATES of sowing and harvesting in each DISTRICT of PUNJAB, roughly stated from the replies of DISTRICT OFFICERS appended.

District.	KHARIF.		RABI.		REMARKS.
	Sown.	Reaped.	Sown.	Reaped.	
Delhi	June, July	October	September, October	April, May.	
Gurgáon	July	September, October	October	April.	
Karnál	June, July	October	September	Do.	
Hissár	Do.	September, October			
Rohtak	Do.	October	October	March.	
Sírsa	July	Do.	Do.	April.	

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Dates of sowing and harvesting in each district of Punjab, &c.—*continued*.

PUNJAB. Major Wace.	District.	KHARIF.		RABI.		REMARKS.
		Sown.	Reaped.	Sown.	Reaped.	
	Umballa	15th June, 15th July	September, October	15th Sept., 15th Nov.	April.	
	Ludhiāna	July	November	October, November	April, May.	
	Simla	April, May	September, October	November	May, June.	
	Jullundur	September, October	April, May	1st half of July	October, November.	
	Hoshiārpur	Not stated.	Not stated.	Not stated.	Not stated.	
	Kāngra	May, June	September, October	October, November	April.	
	Amritsar	June, July	October and Nov.	October	April.	
	Siālkot	Do.	Do.	September, October	May.	
	Gurdāspur	July	October	Do.	April.	
	Lahore	Not stated.	Not stated.	September, October	April, May.	
	Ferozepore	June, July	October, November	October, November	Do.	
	Gujranwāla	July	November	October	Do.	
	Rāwalpindi	June, July	October	October	April.	
	Jhelum	Do.	Do.	October, November	May.	
	Gujrat	Do.	Do.	Do.	Do.	
	Shahpur	Do.	Do., November	September, October	April, May.	
	Mooltan	July	October	November, Dec.	April.	
	Jhang	July, August	Do., November	October, November	April, May.	
	Montgomery	Do.	Do.	November, Dec.	Do.	
	Muzaffargarh	June, July	September, October	October, November	Do.	
	Dera Ismail Khan	Do.	October, November	September, October	Do.	
	Dera Ghāzi Khan	Do.	December, January	October, November	Do.	
	Bannu	June, July	Not stated.	Do.	Not stated.	
	Peshāwar	July	October, November	October	April, May.	
	Kohāt	June, August	Do.	Do., November	May, June.	
	Hazāra	June, July	Do.	Do.	Do.	

N.-W. P. AND
ODDH.Mr. Elliott and
Mr. Buch.

NORTH-WEST PROVINCES AND OUDH.

The statement (No. 3) appended to the answer to question 3, together with that contained in paragraph 7 of the answer, gives for each district a list of areas under principal crops distributed over the whole cultivated area of the province.

The staple foods of the country are,—

*Kharif or rain crops.**Primary.**Secondary.*

Joār (holcus sorghum).
Bājra (penicillaria spicata).
Indian-corn (zea mays).
Rice (oryza sativa).

Mandua (cynosurus coraco-
nuso).
Pulses, 5 kinds grown with
bājra and joār.

Sawān (panicum milia-
ceum).
Kodon (paspalum frumen-
taceum).

*Rabi or winter crops.**Peas.*

Wheat (triticum vulgare).
Barley (hordeum hexastichum).
Gram (cicer arietinum).
Peas.

Joār and bājra are universally grown; the former on better land than the latter, which is the staple crop in the rains on inferior and more sandy soil.

With them are grown the following pulses ;—

Urd (phaseolus radiatus).
Mung (phaseolus mungo).
Moth (phaseolus aconitifolius).
Mash (phaseolus sativa).
Arhar (cytisinus cajan).

The first of these, urd, is sometimes grown alone. The other seldom.

The poorer classes, that is to say, the great majority of the people, live on the cheapest kharif grains from

September or October till the spring harvest comes in, and on barley, gram, and peas from that time till the autumn. Where rice is much grown the coarser kinds are mainly consumed by the lower classes. Wheat and the finer kinds of rice are almost entirely reserved for the consumption of the rich, who also live on the millets joār, and bājra, to some extent in the cold weather. Both the millets and cereals are usually ground into meal and baked in round thin cakes; they are eaten either with dāl, i.e., pulses mashed and boiled into porridge, or with ghi, or both together; salt is always added, but there is not much demand for pepper.

Joār and bājra are sown shortly after the commencement of the rains, and lateness in the fall of rain is a disadvantage. Bājra can, however, be put in later than joār. If no rain falls before the 15th of August they can hardly be sown, or if sown, and no rain falls for a month after the crops come up, they are burnt up, unless protected by irrigation, destroyed by heat and drought.

Rain therefore in June or the beginning of July, and again in August or early in September, is most required.

Arhar cannot be sown later than joār and bājra, but it stands a subsequent failure of rain better, and lasts when they do not.

Indian-corn is not (for a reason not yet ascertained) grown in Fātehpur, Allahabad, Hamīrpur, and Bānda. Elsewhere it is a very useful crop, and can be put in as late as 1st September.

Indian-corn can, however, be sown as late as October if rain falls, and such was actually done by the Meerut Jāt cultivators in 1877, but, as far as I can understand, nowhere else.

Rice requires rain at different periods and quantities according to locality. Much rice land where water is shallow is useless without heavy rains, and but little can be sown at all if there is no rain before the 15th of August. The times of sowing and reaping vary according to the temperature of the climate, and

THE STAPLE FOOD GRAINS.

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sowing is, generally speaking, a fortnight earlier, and reaping a month earlier, at the eastern than at the western extremity of the province. October-November are the sowing months, March-April the harvest months. Rain is needed in August-September for ploughing. If the ordinary rains fail altogether, it is still possible (as happened in 1877), by the help of a downfall in October, to plough the land and sow the spring crops; but if no rain fall till the 15th October, much land cannot be prepared for seed, and every day's delay after that date diminishes the area up to the 1st December, when it may be said that zero is reached.

If again the ordinary rains stop during August, and there is no rain in September, the soil becomes so dry by sowing time (the middle of October), that the seed will hardly germinate without artificial irrigation. Rain is again most valuable if it falls at the end of December or in January, but not more than an inch is required then. If the winter rains fail entirely the produced on light unirrigated soil is almost nil.

The following can be sown as special crops under failure of rain :—

Carrots and potatoes, grown with artificial irrigation and sown in September-October, can be gathered in November to February. They are most useful under a failure of kharif (see separate note on carrots and roots as emergent crops).

Chena (panicum frumentaceum) can be sown in March and April and reaped in May and June. This is a most useful crop under a failure of rabi, and it is often grown as a supplementary crop after the rabi is reaped, but it requires an abundant and constant supply of water.

Gourds of all kinds sown in March and April and gathered from May to August. Some kinds sown with the kharif crops are gathered earlier than the kharif harvest. Gourds are vastly resorted to when stocks of food are short, on account of their quick growth.

BENGAL.

The staple food of the great body of the population of Bengal is rice. In some of the Northern districts and in Behar, rice cultivation is supplemented more or less by rabi or dry weather crops, the chief of which are wheat, barley, and pulses; and by bhadoi or intermediate crops consisting principally of Indian-corn, millets, &c. In districts where rice only is grown, the early rice and the late rice correspond to the bhadoi and rabi crops of the Behar and other drier districts.

The cultivation in the most western parts of Behar assimilates itself to that obtaining in the North-Western Provinces.

All known famines in Bengal have been rice famines. In Behar and Northern Bengal the rabi and bhadoi crops have often been the turning point between famine and no famine; but even there the immediate cause of such scarcities and famines as have occurred was the failure of the rice crops.

Other intermediate crops are grown on such a comparatively small area that they need not be taken into account. Their failure would not in itself produce famine, or even scarcity.

The rice and bhadoi crops are dependent on the summer or monsoon rains; the rabi crops on the winter or cold weather rains. Of the rice crop there are in Bengal three main varieties—(1) the early rice, which is also known as the summer or autumn rice; (2) the main crop or winter rice; and (3) the late or spring rice.

The first is sown on the highest, the last on the lowest lands; a year of excessive rainfall is as good for the former as it is bad for the latter.

The question of famine or no famine depends solely on the main crop, which is sown between April and June, and reaped between November and January according to the district concerned—its soil, climate, rainfall, &c.

There are three critical periods in the life of this crop during which rain is required, viz. :—

(1.) In May and June for sowing, when light rains are required;

(2.) In July and August for weeding, transplanting, and sub-soiling, when heavy rain is required; and,

(3.) In September and October for maturing the growth and filling out the ear, when moderate rain is necessary.

The last of these stages is the most critical, and it is to the failure of the rains in September and October that all famines in Bengal have been due.

A late fall of the monsoon rain in October is also required in districts where rabi crops are grown for the preparation of the land for rabi sowings in November. After that month the rabi is less dependent on the rainfall than the rice crops; but it requires showers during intervals of a fortnight or three weeks until the crop arrives at maturity, when the cultivators desire fine weather for harvesting, and dry, hot, west winds for drying and threshing it out.

Excessive rain has never been known to cause a famine in Bengal, even indirectly by causing floods. It damages the rice crop and rabi crop only when it falls at two stages of their growth, viz. : (1) the earlier—i.e., before the young plants are high and strong enough to bear it, and (2) the latter—when the grain is formed in the ear and the plant is beaten down by the rain. Exceedingly good and promising crops have often been damaged by heavy rain, especially at the later stage of their growth, but never to such an extent as to cause any widespread distress. The bhadoi and early rice crops are sown in April and May, and reaped in August and September. They require only a moderate rainfall at regular intervals. The rabi crops and late rice are sown in October and November, and reaped in April and May. They are more independent of rainfall than either of the other two class of crops, and irrigation from wells and jheels is generally resorted to in the absence of favourable rain.

In many of the districts of Chota, Nagpore, and Southern Behar, the fruit of the mohwa tree forms, in both bad and good seasons, an important element in the food supply of the poorer classes. It is also extensively used for the manufacture of country spirit. The mango fruit forms in many districts an important item in the food of the people for about three months of the year (May to July).

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N.-W. P. AND
ODDH.Mr. Elliott and
Mr. Buch.

BENGAL.

Mr. Toynbee.

CENTRAL PROVINCES.

Joár is the staple food in Nagpur, Wardha, Nimar, Western Chanda, the south of Chhindwara and of Betul.

Joár ordinarily is sown from the first fall of rain on the poorer and higher grounds till the end of July in lower lands. The critical time is through August, when a total cessation of rain will destroy the plant on the high lands, and an excessive fall will rot the seed and young plant in the lower grounds. Again, after full rains in August a total cessation in September will destroy the plant on the high grounds, but heavy rain will benefit high lands, and will not injure the low lands to any considerable extent. The rains which fall at the end of September, or early in October, will determine whether the out-turn be well above or far below the average.

The inferior variety of joár cultivated on the high grounds is harvested in November; the bulk of the crop on richer soil in December. The cultivation of the lighter sort is on the increase, as it is almost independent of the uncertain October rains.

Kodo and kutki may be said to be the staple food of the hill tribes of the Satpuras, i.e., of the hills of Nimar, Hoshangabad, Narsinghpur, Betul, Chhindwara, Seoni, Balaghat, Mandla, and Bilaspur; also of the poor strip of country in Jubbulpore, Damoh, and Saugor lying against the Bundelkand States. Its critical time is from the third week in July to the third week in August, when, if no rain falls, or there is an inadequate supply, the crop is lost; much of this is cultivated in dhyas or bewar fashion.

The following extracts from the Mandla Settlement Report show the nature of the cultivation:—

"As the dhya cultivation comprises no small amount of the general area, I will endeavour to describe it clearly. With no other instrument of agriculture but the axe and a small sickle (hussia) it is astonishing to see the extent of clearing one village of Bygas makes on the sides of the hills on which their village is located.

"Until lately, it was their habit to select the spots for their dhyas with an utter disregard for all the rules of forest conservancy.

"Where the trees are largest and most numerous there will the Byga resort, and in the cold weather months will cut down sufficient wood to cover pretty closely the whole of the area he means to bring under cultivation. In May and June, just before the setting in of the rains, this wood and the brushwood in which it has fallen is set fire to, and almost before the fire is out the Bygas may be seen taking up the ashes and spreading them over the whole surface of their field.

"This is done either with a bundle of thorns, or with long bamboos, until there is a superstratum of about an inch of ashes spread over the ground. In these ashes they sow kodo (*paspalum frumentaceum*), kutki, and occasionally a poor specimen of rice called here 'bygunna.' From being on the side of a hill, the ashes are cut up into furrows by the action of the rains, and often much of the seed must be washed away altogether, but sufficient seems to remain for the Byga's wants. When sown, the field is fenced round very roughly and strongly, small trees being felled so as to fall one on the other. The interstices are filled in with bamboos, and the boughs are carefully interlaced, so that the smallest kind of deer cannot effect an entrance. In addition to this, where there is any danger of the crops being eaten up by wild buffaloes or bison, which push through any ordinary fence, the Bygas bury a line of broad-bladed spears, called 'dansas,' in the ground, at about the spot where these beasts would land if they jumped the fence. They then watch their opportunity, and sneaking round to the opposite side, give a series of yells which send the cattle off terrified over or through the fence; generally more than one is wounded and often one killed on the spot; the rest once started, make straight away, and never visit that field again.

In the fences round these 'bewars,' as these patches of cultivation are called, are usually two or three cunningly contrived traps for small deer, something on the principal of the old figure of 4, and several nooses for peacocks, hares, &c. These the Byga carefully examines every morning, and great is his delight when occasionally he finds a panther crushed under one of the 'figure of 4' traps. One of these bewars lasts the Byga at the outside three years. He usually leaves sufficient wood on the ground the first season to last for a second season's burning. The third year, if by chance he should make up his mind to stick to one field for so long, his labour is much enhanced, as he has to cut and dry the requisite wood at some little distance, and lay it over his field. In addition to this, the out-turn of the crops falls off every year, so that altogether the Byga has every inducement to change the *locale* of his cultivation, and where no restriction has been put on his movements, as a rule, he does so.

"It takes six or seven years before one of these old 'bewars' is sufficiently covered with wood again to make it worth the Byga's while to cultivate it a second time. In three years it is probably densely covered with brushwood, but this, if burnt, leaves so little ash that it has to be largely supplemented with timber; and as this has been previously cut all round the clearing it becomes a work of supererogation to take up one of these old plots before the wood has well grown, when other and more suitable land is available.

"It is much to be regretted that these people have caused such devastation in the forests, and it is really difficult to believe that so few people could sweep the face of the earth so clear of timber as they have done in the Byga country *par excellence* at the head of the Burher and the rivers which water the Partabgarh Taluka. If carefully looked after, the injury they cause to the forests there may be made more negative than positive, by placing certain restrictions on their wandering habits; and keeping them within the boundaries now fixed for them, which have been selected so as to allow them wood enough for their wants, but in situations where, owing to their previous devastations or the inaccessibility of the locality, the timber is of little value. These arrangements were sanctioned in March 1868, and I sent out the superintendent to see that they were properly carried out in Partabgarh and Mokutpore. The result was that 7,794 acres of land have been allotted to these people in 12 villages; the amount of their present cultivation roughly measured is 1,431 acres, so that a little over five times its area of cultivation has been allotted to each. Formerly the areas claimed by these people amounted to over 30,000 acres. They have expressed themselves quite satisfied with the arrangement made for them. But if the country were opened up to trade and the value of money became more known, the Bygas would soon learn wherein their own advantage lay, and would do, as their brethren have done in other parts of the country, drop the axe and take to the plough; but until we have shown them what benefit it is to them, and in fact have created wants which their present primitive habits will not enable them to provide for, we cannot expect them to change their nature."

Rice is the staple food in Sambalpur, Bilaspur, Raipur, Bhandara, Balaghat, Eastern Chanda, and, with a rabi joár and other grains, in the sub-division of Sironcha.

The lighter and higher grounds are sown late in June and early in July. This is harvested late in September and early in October.

Its critical time is August; a total cessation would destroy the crop, an excessive fall would certainly not injure this crop. It depends on the rainfall between say 21st August and 8th September to determine whether the out-turn will be well above or far below

the average, unless indeed this period shall have been preceded by copious and continued rain.

The richer and lower grounds are tilled by transplantation from the seed beds early in August, the seed beds having been sown at the beginning of the monsoon. Such areas as cannot be supplied from the seed beds by transplantation are sown broadcast with seed grain already brought to the germinating point. This is done early in July, as soon as there is a sufficiency of rain water accumulated in the prepared fields. This crop is harvested in November. This requires heavy rains during the transplanting period, early in August. Cessation of rain at this time would be very destructive. Showers through September will suffice up to the end of the month, when the heavy eastern rains are anxiously looked for, as they determine the abundance or scantiness of the out-turn.

Wheat is the staple crop of Hoshangabad, Narsinghpur, the southern and western portions of Saugor, most of Damoh, the Nerbudda water-shed portion of Jubbulpore, Seoni and the rest of Mandla, and the central parts of Chhindwara and Betul.

Mr. Elliott, in his Hoshangabad Settlement Report, gives the best possible description of the influences of the season at the time of sowing:—

"The prospect of the crop depends very much on the weather about sowing time. The most favourable case is when the rains last till about the middle of September or the beginning of kowar, so that the bukhurni is over by the dascrah, and a smart shower falls at that time; when this happens there is plenty of time to cultivate and sow all the land before it becomes too dry. The next best case is when the rains continue later, till the end of September, and then the ploughing and sowing are got over at once, escaping from the great heat of September. The worst case is where the rains end early, and no after-showers fall. Thus in 1863 the rains stopped on the 5th September; the cultivators hoping for more rain,

would not begin the bukhurni at once, so that by the time the fields were ready for sowing (early in October) they were nearly dried up.

"A very heavy shower of three or four inches fell early in October, and set things right again, producing a late but superior crop; but in the few villages along the river where it did not fall half the land was left unsown. In 1864 the rains ceased on the 15th September, and sowing was commenced about the 17th October: the light lands were a good deal dried up; but about the 25th October a smart shower fell: and the season thus corresponded to what I have described as the best possible case.

"If, however, the rain had fallen directly after sowing, it would have been injurious, as then the surface soil becomes a paste, which presently hardens, so that the weak germ cannot penetrate through it."

In the southern districts the cultivators prepare their fields, and defer the sowing till after the usual time for the hathi or elephant showers coming from the south-east. These showers are uncertain. When they do not come by the 10th October the seed is at once sown. If these showers should come after the seed is sown, the fields will be re-ploughed and sown again. From this time till the middle of December clear weather is hoped for. If moderate rain then fall, followed by clear weather, the crop will be good, unless injured by hail. If the fall be anything but moderate, and if it be succeeded by a continuance of cloudy weather, blight or rust will be apprehended. But average rabi crops may be expected if there be no rain, provided that dew falls abundantly in December. If there be no rain and no dew, the out-turn will probably be below an average.

The wheat seasons are fully a fortnight earlier both for sowing and harvesting in the southern districts. In the Nerbudda Valley sowings continue up to the middle of November. From the day of sowing 4½ months are calculated to the day of reaping.

FOREST PRODUCTS USED AS FOOD BY THE HILL TRIBES OF THE SATPURA HILLS.

The hill tribes of the Nimar, Hoshangabad, and Betul districts depend for a considerable portion of their food supply on forest fruits and other produce. Of these the flower and fruit of the mhowa tree are the most important, both on account of their highly nourishing properties and the large quantities in which they are consumed. Except when variety is required, or when the ber is still in season, the sun-dried mhowa flower forms a part of every meal, being eaten with boiled rice and the lesser millets or kneaded with dough to make bread. The proportion of sugar in the fleshy corolla is exceedingly large, combined with a small quantity of some nitrogenous compounds. This gives it great nourishing powers, and its general use effects a considerable saving in the consumption of cereals. I am unable to state exactly what this saving is, but it cannot be put down at less than 20 per cent., after making allowance for the increased quantity of the cereals consumed on account of the improved flavour imparted by it to the latter. The seed of the mhowa, or rather the cotyledons of the seed, contain about 25 per cent. by weight of oil. This oil is expressed by the hill people themselves by a very simple process. The testa or skin being removed, the seed is pounded and boiled, wrapped up in two or three folds of an old blanket and pressed between two boards. Besides being used for lighting, the oil forms a very inexpensive substitute for ghi, which it resembles in colour and consistency. Taking the flower and the fruit together, a provident family can live well and save at least 30 per cent. of cereals by

laying in a sufficient supply of those products for the year's use.

As already mentioned, the ber also enters largely into the food of the hill tribes. Besides being eaten as an ordinary fruit, it is stoned and mashed into a kind of thick sauce or purie with a little water, salt, and Cayenne pepper, and used with bread or boiled cereals. For this latter purpose, the ber is of course as good dried in the sun as when broken off the tree, and thus an inexhaustible supply of it may be stored up every year irrespective of drought and scarcity.

The roasted seed of the mahol (*Bankinia Wahi*), a common, hardy, gigantic creeper, is eaten with great relish, many making a complete meal of it. This bean is in season from January to February. The whole bean is roasted in hot embers until the woody pod is nearly charred through. The seed has not a disagreeable taste, but is slightly astringent, and highly indigestible for those unaccustomed to it.

During the rains and cold weather, the tubers of some wild species of arum, curcuma, and yam are extensively eaten, and can form a complete substitute for the cereals, at least for a limited period.

The above are the more important forest products which make up a considerable part of the diet of the hill tribes here. There are many other trees and shrubs of which some part is edible, and which are used by these people during their respective seasons. Some of them are given in the following list, which I have drawn up with a few summary remarks:—

Name of species.	What parts eaten.	How eaten.	Season.
<i>Argyrea uniflora</i>	Flower bud	Cooked	May to August.
<i>Moringa pterygosperma</i>	Flowers	Do.	January to April.
	Young leaves	Do.	March to April.
	And leaf buds	Do.	Do.
	Tender fruit	Do.	Do.
<i>Indigofera pulchella</i>	Flowers	Do.	January to June.
<i>Bauhinia variegata</i>	Flower buds and tender leaves	Do.	February to March.
Do. <i>purpurea</i>	Flower buds	Do.	December to January.
Do. <i>malabarica</i>	Tender leaves	Do.	April to November.
<i>Randia dumetorum</i>	Young fruits	Do.	June to July.
<i>Gardenia turgida</i>	Do.	Do.	May to June.
Do. <i>latifolia</i>	Fruit	Do.	November to February.
<i>Ficus infectoria</i>	Young shoots and fruit	Cooked and uncooked	May to June.
Do. <i>religiosa</i>	Do.	Do.	April to May.
Do. <i>glomerata</i>	Fruit	Do.	Do.
Do. <i>indica</i>	Do.	Do.	Do.
Do. <i>hispida</i>	Do.	Uncooked	Do.
Do. <i>cordifolia</i>	Do.	Do.	May to June.
<i>Phyllanthus emblica</i>	Do.	Raw and cooked	October to March.
<i>Phoenix sylvestris</i>	Do.	Uncooked	March to April.
<i>Cordia Myxa</i>	Do.	Do.	May to July.
<i>Diospyros melanoxylon</i>	Do.	Do.	March to May.
<i>Buchanania latifolia</i>	Fruit and seed	Do.	April to May.
<i>Alangium Lamarekii</i>	Fruit	Do.	May to July.
<i>Eugenia Jambolana</i>	Do.	Do.	June to July.
<i>Schleichera trijuga</i>	Do.	Do.	Do.
<i>Egle marmelos</i>	Do.	Do.	October to April.
<i>Grevia polygamia</i>	Do.	Do.	November to December.
Do. <i>laevigata</i>	Do.	Do.	Do.
Do. <i>vestita</i>	Do.	Do.	August to November.
Do. <i>asiatica</i>	Do.	Do.	April to May.
<i>Flacourtia Ramoutchi</i>	Do.	Do.	May to June.
<i>Ulmus integrifolia</i>	Seed	Do.	May to July.

Jowari is the staple food of the province. In 1876-77 it occupied 35.10 per cent. of the total cultivated area of the province, and 68.31 per cent. of the area cultivated with food grains. It is sown in the end of June or beginning of July, as soon as the cotton sowings, which first receive attention, are completed. It is reaped in the end of November or beginning of December. From the time it is sown, until the end of September, any prolonged period of dry weather is hurtful to jowari. It specially requires good rain in August. The best crops of jowari are raised when the monsoon rains are equitably distributed over the months from June to September, and aggregate 28 to 35 inches.

Prolonged wet weather, such as we have had this season is damaging to the jowari in low lands.

The jowari crop is again sometimes damaged in autumn by unseasonable rain falling at a time when the heads of grain are ripening, the effect of which is to blacken and rot the grain.

Wheat is the next most important crop. It occupied in 1876-77, 8.39 per cent. of the total cultivated area.

It is everywhere a cold weather or spring crop. A full south-west monsoon is necessary to prepare the soil for it, and late rain improves it.

The general facts are that the poor people eat millet in the inland districts, and nagli, wari, &c. on the coast and Ghats, while the richer classes eat wheat and rice. Of the millet, bajra is grown on the drier and lighter soils, and jowari on the richer. The very poor eat inferior grains, such as kodra inland and harik on the coast. Rice is largely grown in the coast district, and along the top of the Ghats, because the early and heavy rainfall suits it. In the northern inland districts, jowari and bajra grown (with cotton) as a kharif crop, require rain for sowing and germination in June and July, after that, timely showers until the end of August, when a good fall is needed to bring the grain into ear. It is harvested in October or November. Wheat depends on the later rain (September and October), and if the ground has been well saturated at the sowing, it ripens with the aid of the dews only in November and December, and is harvested in February or March. In the East and South Deccan jowari is grown largely as a later crop, in dependence of the heavy rainfall usual there in September and October. Generally a moderate rainfall is sufficient, if it is well timed, to meet the requirements above indicated, and excess or failure at any period injures the crop.

The collectors' answers are as follows:—

Kaira.—The staple food is bajra and the coarser millets. Also rice, bajra, and kodra are sown as soon as the ground is well saturated, in June or July. They require rain about three weeks after the plants are above ground, and later to bring them into ear. Rice and bhoota require heavy rain early in the season before transplantation. When that is successfully done, they can bear almost any amount of rain. Heavy rain damages the millets after they come into ear. Want of rain in June, July, and August causes them to burn up, but bajra can be re-sown up to August, and jowari even later.

Broach.—Jowari is the principal food grain. It is partly sown in June and harvested in October, but the main crop is sown in August and harvested in February. Wheat is sown in September or October, and ripens in March. Jowari is the staple food in the black soil and bajra in the light soil villages. The failure of the early rain would injure the bajra, and of the later rain the jowari. The later rain is supplemented by heavy dews from October to December. Cold following on an excessive rainfall (month not given) destroyed the crops (cotton and jowari?) in A.D. 1835.

Surat.—Rice, jowari, bajra, wheat, nagli, and kodra are the food grains. All these, except wheat, are sown in June or July, and rice is harvested first, then bajra, and jowari in December. Wheat is sown in September or October, and harvested in March. The rice will fail unless there is a copious early fall. Early and timely rain in June, July, and August is needed for bajra and jowari, and later rain for wheat and gram.

Thana.—Rice, nagli, and kodra are the staple food grains. Rice is sown at the beginning of the monsoon (June). When the plants are a foot high they are transplanted from the nursery to the field. Towards the end of October the crops are reaped. Thus rain is needed in June, and a copious fall in July at the time of transplanting. After that light rain and sunshine, and again a good fall in September. Nagli requires a similar rainfall. Any inversion of these rainfalls injures the rice.

Colaba.—Rice is the staple food, with nagli and wari for the poor. Rice is sown early in June and harvested in October. Nagli the same. They require heavy rain from June 15th to August 15th.

Khandesh.—Bajra, jowari, and wheat are the staples. Jowari is sown early in July (according to the rain) and harvested in November. Bajri is sown in the latter half of July and harvested in October. Wheat is sown in the latter half of September and harvested in January. Jowari and bajra require good rain to make the seed germinate, then timely showers until about three weeks before harvest, when good rain is required to make the heads fill. All the cereals are liable to injury from heavy rain in their flowering season.

Nassick.—Bajra is the staple food—the facts are the same as those for Khandesh. Wheat and gram are sown in October and harvested in February, mostly for export. They want rain in December to give a good crop. Rice is grown on the Ghats, is sown in June and reaped towards the end of October. Nagli is the staple food of the people near the Ghats. It requires less moisture than rice, but is a poor grain.

Ahmednagar.—Bajri and jowari are the staple food grains. On the west Ghats rice and nagli are grown. Wheat is grown for the rich. Bajri is sown in June or July and reaped in November. Wheat, jowari, and grain are sown in September and reaped in February or March.

Poona.—Bajra and jowari are the staple food of the poor, and wheat and rice of the rich. Bajra, jowari, and rice are sown in June or July, harvested in Octo-

ber and November. Wheat is sown in November and reaped in February and March. Rain in August is essential to the kharif, and showers in November and December for the rabi. Excessive or very scanty rain in August injures the kharif.

Sholapur.—Bajra and jowari are the staple food. Bajri is sown in June or July, and jowari as a rabi crop (September or October), and harvested in March. If the ground is well saturated when jowari is sown in October it does not require much more moisture.

Satara.—Jowari and bajra, and in the western talukas rice and nachni, are the food grains. Jowari and bajri are sown in June, jowari also as a rabi crop in October. Rice and nachni in June. These require heavy rain at sowing and transplanting. The rabi jowari requires rain at the end of September, and showers in December.

Kaladgi.—Jowari and bajra are the staple food. Bajri is grown as a kharif crop, and jowari as both kharif and rabi. The times of sowing and harvesting are those given above. The kharif requires rain in June, July, and August, and is injured by heavy rain after it is in ear. The rabi requires rain in August and September.

Dharwar.—The staple food is rice in the west border of the district, and jowari in the rest. Rice is sown in May and reaped in November. Early jowari is sown in July and reaped in November or December. Late jowari is sown in September and reaped in February. For the rice and early jowari rain is needed in June and July. For the late jowari a few heavy falls in October. Heavy rain in October causes mildew in the early jowari. Heavy rain in December causes blight in the wheat.

Ratnagiri.—Nachni, wari, and harik are the food of the poor. Rice is grown chiefly on the coast. The crops are divided into early and late. Heavy rain is necessary in June for sowing, and in July for transplanting. Showers and sun in August and September. A good fall at the end of September. The late crops further require a good fall in the middle of October. A late monsoon injures the coast crops, and failure of rain in October the hill crops.

Canara.—Rice is the staple food of the upper, and ragi of the lower, classes. They are both sown in June or July and harvested in October and November. In low lands a second crop of rice is sown in December. Rain is needed for the rice in June, July, August, and September.

The grains which form the staple food of the people of Sindh are joar, rice, bajra, wheat, mung (dhāl).

The first three being kharif products, are sown in June and harvested from October to December. The crop is secure whether rain fall or not; but it is immensely improved in quantity and quality by rain in July and August. Rain coming later than the early part of September is injurious, causing smut and

blight. Wheat and other rabi crops are much more dependent on rain than those of the kharif. A timely fall in January and February makes a vast difference in the yield. Cloudy weather late in the rabi (the end of February and March) is always followed by blight. This with frost and premature setting in of hot winds is what proves most injurious to the rabi crops.

The staple food grains of the presidency are—

Paddy (*Oryza sativa*).
Cholum (*Sorghum vulgare*).
Cumboo (*Penicillaria spicata*).
Ragi (*Eleusine coracana*).
Varagu (*Panicum Miliaceum*).
Korra (*Panicum Italicum*).
Samai (*Panicum miliare*).
Different kinds of pulse.

The following table shows those grown in each district, and the proportion of cultivated area under each to the total area under food grains. The percentages have been calculated with reference to Ryotwar and Inam lands only, which form the bulk of the lands in the presidency, and for which alone information is available, but it may be generally presumed that the same proportion is preserved throughout all the lands in the district.

CHAP. I. QN. 5.

MADRAS.

Board of
Revenue.

Districts.	Staple Crops.	Proportion of Cultivated Area under each to Total Area of Food Grains in each district.	Districts.	Staple Crops.	Proportion of Cultivated Area under each to Total Area of Food Grains in each district.
		Per-centages.			Per-centages.
Ganjam -	Paddy -	69	South Arcot -	Paddy -	40
	Ragi -	19		Cumboo -	21
Vizagapatam -	Paddy -	43		Varagu -	18
	Cumboo -	28		Ragi -	14
	Ragi -	11	Tanjore -	Paddy -	79
Godavari -	Paddy -	69		Varagu -	9
	Cholum -	9		Cumboo -	4
	Pulses -	12	Trichinopoly -	Paddy -	22
Kistna -	Paddy -	20		Cumboo -	18
	Cumboo -	9		Varagu -	18
	Varagu -	8		Cholum -	17
Nellore -	Paddy -	16		Ragi -	12
	Varagu -	24		Pulses -	8
	Cumboo -	8	Madura -	Cholum -	22
	Pulses -	6		Paddy -	19
Cuddapah -	Cholum -	31		Cumboo -	13
	Cumboo -	24		Ragi -	12
	Paddy -	10		Samai -	12
	Ragi -	8	Tinnevely -	Varagu -	10
	Korra -	7		Cumboo -	25
Bellary -	Cholum -	40		Paddy -	24
	Samai -	23		Samari -	17
	Cumboo -	8		Cholum -	9
	Paddy -	5		Varagu -	7
	Ragi -	3		Ragi -	6
	Pulses -	17		Pulses -	10
Kurnool -	Cholum -	50	Coimbatore -	Cumboo -	36
	Korra -	19		Cholum -	30
	Varagu -	8		Ragi -	10
	Cumboo -	5		Paddy -	4
	Paddy -	4		Pulses -	10
	Pulses -	9	Nilgiri -	Korra -	37
Chingleput -	Paddy -	78		Samai -	17
	Varagu -	9	Salem -	Ragi -	28
	Ragi -	7		Cumtoo -	25
North Arcot -	Paddy -	45		Paddy -	9
	Cumboo -	15		Cholum -	5
	Ragi -	15		Samai -	5
	Varagu -	10	South Canara -	Pulses -	18
	Pulses -	7	Malabar -	Paddy -	91
					98

MYSORE.

Mr. Lacey.

The staple food of the Kanarese people of the Bangalore District is ragi. The Tamilians and others who migrated from the coast and settled here, and the higher castes of Hindus, live on rice. Ragi is sown in July and reaped in November or December.

Early paddy is planted in January or February and reaped in June; and that the late paddy is sown in June or July and reaped in January. Horse-gram (kulthi) is sown in September and reaped in January. It is extensively grown for sale, but is not used as an article of food.

Potatoes and sweet potatoes and maize are also cultivated in gardens, and depends upon the supply of water in the wells. These are also used as articles of food, but are not considered sufficiently important to form a meal of themselves.

Avare or beans, and togari or dāl, are sown and reaped with the ragi.

MYSORE.

Heavy soaking rain is essential when the lands are to be ploughed and prepared, and in order to fill the tanks, light and frequent rains with occasional heavy showers are required when the ragi is growing. The horse-gram requires rain when sown, but it matures under the influence of the heavy mist usual in December and January. If the tanks have a fair supply of water, paddy requires but little rain. The most critical time at which rain is essential for the ragi crop appears to be in the month of September. A failure of rain in that month blights the crop and hinders the sprouting forth of the ears.

Excessive rain injures the ragi crop when sown and in the earlier periods of its growth; but after it has attained the height of 4 inches no amount of rain will be injurious. Dry weather will, however, be required at harvest time, which we may generally reckon on.

RAJPUTANA.

Captain Barr.

Jodhpur and Jesalmir.—Wheat, bajra, moth, barley, maize, joar, and moong form the staple food of the people. Bajra, moth, joar, maize, and mung are the rainy crops, these are generally sown in July and reaped in November. An immense area of the sandy tracts is sown with bajra, the rain sinks into the sandy soil and but little of it escapes, the seed is sown very deep in the low ground between sand hills, and here, with but a few showers, the crop grows readily and produces in a good year a plentiful harvest. Rain is most necessary to the kharif crop during the month of August, an excessive rainfall has not been known in

RAJPUTANA.

this district, or at any rate is not within the memory of man. A failure of rain during August and September and an exposure of the young shoots in a sandy soil to the full blaze of the sun in those months, causes a destruction of the crop.

The rabi crops, consisting of wheat and gram, are sown in October and November and are harvested in April and May, the critical period, or rather that in which rain is most beneficial to these crops, is from the end of December to the middle of January; a failure of rain at this reason does not, however, necessarily entail a failure of crops, for in the first place

wheat and gram are for the most part grown only within the limits protected by the irrigation, alluded to above, obtained from the Luni; and secondly, in years of abundant rainfall during the monsoon months the land used for the rabi retains sufficient moisture

to bring the crop to harvest, but rain during the cold season is most valuable, and after seasons of partial failure of the south-west monsoon, has frequently been the means of saving large areas from famine.

CHAP. I. QN. 5.

RAJPUTANA.

Captain Barr.

CENTRAL INDIA.

CENTRAL INDIA.

Mr. Wingate.

	Staple Food.	Sown.	Harvested.	Rain required.	Rain injurious.
Bhopal -	Wheat -	November	February -		
	Joar -		November -		
	Rice -		September -	June, July, and September.	Heavy in August is injurious.
	Makka -	June -	November -		
	Bajri -				
	Mung -				
Baghelkhand* -	Kharif.				
	Kodoo -	June-July	Oct.-Nov.	June-July : Oct.-Nov.	Excess bad.
	Joar -	June -	November -	June -	August.
	Sawan -	June -	August -	June.	
	Kakun -				
	Murwa -				
	Bajri -	August -	Oct.-Nov.	August and end of September.	Much rain bad.
	Coarse Rice -	June -	November -	June and Sept.	August.
	Rabi.				
	Gram -				
	Muttur -	October	April -	January -	February.
	Jow -				
	Mhowa -				
W. Malwa -	Indian-corn -	June -	September (end) January.	June and Aug.	Excess in June and July, and in September for Indian-corn, or November for joar.
	Joar -				
Rutlam -	Indian-corn -	June -	September -		Excess hurts kharif, benefits rabi.
	Joar -		November -		January, February.
	Wheat -	October	April -	December -	
	Rice -		September -		
Deputy Bheel Agency (Mán-pur).	Joar -	June -	December -		Excess July, August, hurts kharif and benefits the rabi.
	Indian-corn -		September -		
	Tur -		December -		
	Wheat -	October	April -	Winter Rain -	Excess bad: or deficient autumn and no winter rain.
	Gram -		March -		

N.B.—The higher classes eat rice, wheat, and dal (chiefly urd, arhar, and mosur).

HYDERABAD.

HYDERABAD.

Moulvie
Mahdi Ali.

In the Telingana districts, rice and joar, and in the Mahratta country, bajri and joar, form the staple food of the people. The poor people also use lachna, sawan, kodru, kungui, and burrug, and the rich use wheat.

TELINGANA.

Joar.—Sowing commences in Mirg Sira and lasts till Punavis (i.e., 6th June to 17th July). The crop is reaped from Swati to Anuradha (i.e., 22nd October to 30th November). Rain is essential at the time of sowing up to a little before the full development of grain, a period of two months, after which in Magha and Utra, that is, at the reaping of the crop and a little before, rain is injurious. Excessive rainfall a month after the seed has been sown, that is when the seed has germinated, blights the crop. From this cause proceeded the chief injury in 1288 Fusli (1878). Joar requires little rain and is much injured by excessive wet.

Bajra.—For this crop similar remarks apply. It may be added that fall of rain at the time when the crop is in blossom completely destroys it.

Laehna.—Sowing takes place from Ardra to Punarvas (i.e., 20th June to 17th July), and reaping from Vishakha to Anuradha (i.e., 4th November to 30th December). Rain is necessary before sowing and for the development of this grain. Wet is

injurious up to a week after sowing and a little before the crop is reaped.

White joar is sown between Hast and Swati (i.e., 25th September and 3rd November), and reaped between Shatvarka and Purbabhadripada (i.e., 17th February and 15th March). Rain is injurious with this crop up to two weeks after sowing, and becomes necessary a month after that (i.e., in Swati and Vishakha). Failure of rain, however, causes no appreciable injury to crops cultivated in regar soil.

Wheat is sown between Chitra and Vishakha (i.e., 19th October and 17th November), and reaped between Shatvarka and Purbabhadripada (i.e., 17th February and 15th March). The remarks as to rain given under white joar apply to this also.

Abi paddy is sown between Ardra and Ishlesha (i.e., 20th June and 14th August), and reaped between Swati and Jeshtha (i.e., 22nd October and 13th December). Rain is constantly necessary for this rice crop excepting in Swati, when it is injurious. When there is a failure of rain the crop is irrigated from tanks and wells.

Tabi paddy is sown between Purva Asarh and Shervan (i.e., 27th December and 3rd February), and is reaped between Bharni and Rohini (i.e., 25th April and 5th June). This crop requires constant irrigation, which is carried on from tanks and wells.

Kodru, kungui, burrug, and sawan are sown in the Ardra and Punarvas naxtras, and are harvested in

CHAP. I. QN. 5. Hasth and Chittra (about five months after sowing). Rain is essential a little before sowing, and a week after. Rain is essential at least once a week up to the Pûrvâ naxtrâ. If a continued fall of rain occurs after sowing, for a full week, the crop is liable to be injured. Excessive rainfall during the Uttra and Hâsth naxtrâs is also injurious.

MARATWARI.

Yellow and red joar is sown between Mirgsira and Ardra (i.e., 6th June and 3rd July), and reaped between Chittra and Vishakha (i.e., 9th October and 17th November).

Rain is injurious up to four or five days after sowing, when the seed germinates, because earth is cast over the plants. About two months and a half after sowing (i.e., shortly before the formation of the grain, say, in Ragha and Purva), rain injures the crop, because it washes the blossoms away. Rainfall in Hast and Chittra (i.e., 25th September to 21st October), which is the time for reaping, also damages this crop. Moderate rainfall fifteen days after sowing is necessary and beneficial, and a failure at that time causes injury, more or less.

Bajra.—Similar remarks apply to this description of crop.

White joar is sown between Uttra and Chittra (i.e., 15th September to 25th October), and reaped between Uttra Asarh and Dhanishta (i.e., 9th January and 16th February). Rain is necessary for this crop a short time before sowing, and failure of rain at that period causes some injury. Rainfall at the same periods as specified under yellow and red joar is injurious. Although no rain is required for the rabi crops in general (the dews at night being sufficient to nourish them), yet rain in Anuradha (i.e., 18th to 30th November), produces very beneficial results, and showers at that time are spoken of in Maratwari as Satoni kâ Pané.

Wheat is sown between Chittra and Vishakha (i.e., 9th October to 17th November), and reaped between Uttra Asarh and Dhanishta (i.e., 9th January and 16th February). The remarks as to rainfall given under white joar apply to the wheat crop also.

Paddy (sown in ordinary land) is sown between Ardra and Punarbas.

CHAPTER I.—QUESTION 6.

What proportion of the cultivated land, and what class of crops is manured yearly, and what is the average weight of manure given to the acre (1) in land constantly manured; (2) in land occasionally manured. If there is any customary rotation of crops and fallows, state it.

PUNJAB.

PUNJAB.
Major Wace.

This question was referred to district officers for report, and I have appended a tabular statement in which their answers concerning manuring are summarised. The information given in this statement concerning the proportion of the cultivated area which is manured is more valuable than that relating to the amount of manure applied per acre. It is probable that the distinction between occasionally manured and constantly manured has not been understood by the various reporting officers in the same sense. And for the purposes of the question under reply it will be safer to compare the total area manured with the proportion that bears two crops annually. No land can steadily bear two crops a year which is not thoroughly well manured.

In a province such as the Punjab, with a hot climate, and a rainfall in many districts scanty, there is a natural restriction in the general use of manure well known to the native agriculturist, but not sufficiently recognised by those of us who are his critics. Even in England farmyard manure applied in dry summer seasons to light soils is apt to make the land hollow, and liable to be injured by drought.* This fact is well known to the native agriculturist. In most of the tracts where the annual rainfall is less than 25 inches (as in the Hissar Division, in the dry parts of Ferozepore, and the western portions of the Jhelum and Rawalpindi districts), the agriculturists give as a reason for not manuring their unirrigated crops, that manure, when applied, "burns them up." For example, see the entries in the appended statement against the districts of Karnâl, Hissar, Sirsa, Ferozepore, Gujranwâla, and the Mooltan and Derajât divisions, where next to none of the unirrigated cultivation is returned as manured.

But so far as irrigation is available in sufficient abundance, and where the rainfall exceeds 25 inches per annum, the statement gives conclusive evidence of the great value attached to manuring by the native cultivator.

* Wrightson's Handbook of Agriculture, page 114.

Another feature of agriculture in the Punjab, which limits the use of manure, is that in the majority of districts there are considerable areas of land which almost annually receive a valuable deposit of silt. Such are the alluvial (sailâb) lands on the banks and in the beds of the great Punjab rivers, annually covered by their summer and autumn floods; and in a less degree the lands irrigated from the same rivers by inundation canals in the Lower Punjab; also the extensive areas in the Derajât Division at the mouth of the passes which drain the Suliman Ranges; the lands in the Shalpur and Jhelum districts, at the foot of the salt range, and other smaller areas in which floods annually deposit a valuable silt on the soil.

The effect of this annual deposit of fertile silt is to make manuring by so much unnecessary. An estimate of the extent to which the soil is periodically renewed by fertilising additions, which did not take these silt deposits into account, would fall far short of the truth. [The extent of sailâb land in each district is given in a statement appended to my reply to Question 4.]

The description of manure universally and almost solely used consists of the sweepings of villages and towns, human excrement, and the droppings of the village kine, flocks, and other animals. Cowdung preponderates, mixed up with broken straw and litter swept up from the stalls of the cattle.

The unirrigated lands chosen for manuring are usually those nearest the village site; and in the submontane districts each village or hamlet is surrounded with a belt of such lands. The water which drains out of the village when rain falls, carrying with it human excrement and other fertilising substances, is also usually directed on to these lands.

In the manuring of irrigated lands other considerations come into play. The manure must be carried to the lands that are irrigated. In the case of irrigation from wells, these wells are usually dotted about at a greater or less distance from the village, and the fields nearest the well being those most abundantly irrigated, and most easily watched, are

MANURE AND ROTATION OF CROPS.

CHAP. I. QN. 6.
PUNJAB.
Major Wace.

always selected for the highest manuring. The cultivators with their families and cattle usually have sheds at their wells where they live in the busiest agricultural seasons.

As regards the amount of manure applied per acre, the weak point in the replies appended is that the varying treatment of the different crops manured is not detailed. Sugar-cane, opium, tobacco, turmeric, and vegetables are very highly manured; while to cereals a smaller quantity of manure is applied. The rate probably usually varies from 8 to 15 tons (200 to 400 maunds per acre).

Undoubtedly, in the agriculture of the Punjab the rotation of crops does not hold that prominent place which it does in that of England. That the principle is understood and applied (with a degree of intelligence which varies with the locality and class of cultivator), will be apparent from a perusal of the papers annexed to this reply; but its practice is confined to a very limited area of the most fertile and best irrigated lands.

This gives rise to the question, viz.:—*Is the absence of any such system on the great majority of the cultivated lands injurious; and is its introduction desirable or practicable?*

These are questions which have as yet received little investigation. Accustomed as we are to regard the English agriculture as the best, a system of which the prominent features are such a combination of cattle farming with agriculture as makes heavy manuring and rotations possible, the native agriculture, in which these features are for the most part necessarily absent, in the minds of most of us stands condemned without further hearing.

I believe that this conclusion is erroneous. That that system of agriculture only is scientific which is practical is the principle which guides even so enlightened a body as the Royal Agricultural Society of England. And if we duly weigh the climatic difficulties with which the native agriculturist has to contend, and the extremely limited capital which he can command, we shall I think be bound to admit that under such circumstances the prevailing systems are no despicable solution of the problem of how to get the most out of the soil without reducing its productive powers.

What may be called the normal system of agriculture in the Punjab prevails most widely in the submontane tracts, where the rainfall exceeds 20 inches per annum. It is a two-year course, principally of cereals; thus—

		Months.	Crop.
Rabi	September to April	8	Wheat.
Kharif	May to June	2	Fallow.
	July to October	4	Millet.
Rest	November to August	10	Fallow with repeated ploughings.
	Total 2 years	24	

In September, sow wheat again, and so on. For either harvest, pulses or seed may be substituted instead of cereals, though this is more usually done in the kharif. Mixed crops are very common, especially in the kharif, for if the rainfall is fickle, the pulse may succeed though the millet fail, and *vice versa*; with the wheat it is very common to sow mustard, which is pulled young and given to the cattle mixed with dry fodder; thereby supplying them with an early green crop when the frost has killed all the grass. An important feature in the millet crops is that, growing as they do to more than twice the height of wheat, a very sparsely sown crop supplies a very large amount of fodder. The area sown with kharif crops on these lands is usually less than the area of the rabi crop, for various reasons which I cannot here explain at length. In the tracts in which this system prevails there is usually no good grazing for the cattle, and one of its principal merits is the large amount of fodder which it supplies. Its justification, as a course providing

sufficiently for the periodical renovation of the soil, depends on the 10 months' fallow, and ploughing, which follows the kharif crop. The ploughing during this fallow commences early in January, and between that date and September the land is usually ploughed over eight or ten times. So long as this is duly attended to the productive powers of the soil undoubtedly do not deteriorate. The repeated ploughings also completely clear the soil of weeds. To an observant eye nothing is more remarkable than the complete absence of weeds in September in the fields where wheat is being sown; in strong comparison with the rank growth of crop and weeds in the adjoining millet fields. The ploughings of the past nine months have killed the old weeds, and prevented the growth of new ones in the fallow lands.

This system prevails from east to west of the province, wherever a rainfall exceeding 20 inches can be relied upon, as testified in the annexed replies and extracts. Variations from it arise from one or other of the following causes: (1) the cultivation of special crops; (2) manuring; (3) a smaller average rainfall than 20 inches; (4) annual flooding by rivers; (5) irrigation.

Cotton.—Cotton is the only important instance of variation due to special crops. It occupies the ground from April to December, and is not unfrequently allowed to stand a second year, and sometimes a third, the plants in such instances being cut down to the roots at the close of each year's pickings in December.

Manuring.—Manuring on the submontane tracts makes it possible for the cultivator to omit the 10 months' fallow, and to secure two crops each year. In these tracts the lands immediately surrounding each village are, as above noted, those usually selected for cultivation in this way.

Small Average Rainfall.—When a rainfall of 20 inches cannot be relied on, we commonly find the two years' system given up, and irrigated and unirrigated lands alike for the most part yielding only one crop a year. Whether that crop will be an autumn (kharif) crop, or a spring (rabi) crop, depends primarily on the average amount of the winter rainfall. In the Hissar Division, where that is very small, the kharif crop greatly predominates. But in the rest of the Punjab the rabi area is usually as 6 to 4. In the Mooltan Division and in the southern half of the Derajât Division, where the rainfall is usually less than 10 inches per annum, no cultivation (with insignificant exceptions) is attempted, unless assisted by irrigation from canals or wells, or by flooding from rivers and hill torrents.

Sailâb, or lands flooded by rivers.—The fertile alluvial lands, which line the banks of the great Punjab rivers, are annually submerged or moistened by the floods caused by the summer melting of the Himalayan snows and by the autumn rains; on these it is of course usually impossible to grow a kharif crop; and the rabi crops grown are wheat and barley on the better lands, and peas and pulses on the poorer ones.

Irrigation.—Where irrigation is obtainable, a more extensive variation of the usual course comes in. The cultivation dependent on well irrigation in the Amritsar and Jullundur divisions, and in other districts with a plentiful rainfall is exceedingly rich; sugar-cane is largely raised; and where that is not grown, two crops and more are grown every year. The cultivation dependent on canal irrigation is equally rich, so far as manure will go. The appended replies of district officers concerning the course of cultivation on the Bâri Doâb Canal (Amritsar and Gurdâspur districts) and Western Jumna Canal (Karnâl and Delhi) do not convey to me any clear idea of what system of cropping prevails on lands irrigated by those canals. But of the system prevailing on the inundation canals in the Mooltan Division, a very clear account is given in the replies of the settlement officers of Mooltan and Muzaffargarh.

There is no doubt that on the Bari Doab and Western Jumna canals continuous cropping has been

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attempted to the temporary injury of the soil. On the Bari Doab Canal such irrigation was to a great extent an innovation; and the people had to learn their experience. On the Western Jumna Canal, the same reason applied in part; and our revenue system was also to blame, for at the previous settlement of 1840, in many instances entire villages were assessed at high irrigated rates on their whole area, which of course left the agriculturists no resource except continuous double cropping, whether they possessed sufficient manure or not.

In concluding this answer, had the time at my disposal permitted, I would have endeavoured to estimate with some approach to exactness the areas to which each of the above paragraphs apply. But perhaps this is of the less importance, because probably in the whole Punjab less than a sixth of the cultivation is manured. In tracts where the rainfall is abundant, and where irrigation is plentiful, the cattle are not in sufficient numbers to supply manure to more than a

limited area. In the tracts further south, where rainfall is scanty, manuring is injurious except on irrigated lands.

The system of cultivation is consequently mainly one under which light crops of cereals and pulses are taken in an unbroken succession from the land; either two crops in one year followed by a year's fallow, or one crop each year, thereby allowing six months interval between each crop; the crops are lighter in the latter case than in the former. It is difficult to condemn this system, because longer fallows would certainly not increase the yield of the land to the extent in which the agriculturists would be losers by the crops given up; and because in the existing circumstances of the peasantry no other resource except increased fallowing is available; on the other hand, the existing systems afford distinct evidence that, so far as irrigation and manure is available, it is intelligently applied to increase the yield of the land.

STATEMENT showing the proportion of Cultivated Land in the PUNJAB which is aided by Manure, compiled from the replies of District Officers.

[Note.—The data of cultivation and cattle are taken from the Administration Report for 1876-77, statements Nos. 8 and 43]. In columns 4 and 5 is given the average rainfall of those Stations in each District which have the highest and lowest averages.

Division.	District.	Average Annual Rainfall.	Description of Cultivation.	Per cent. Irrigated and Unirrigated.	Per cent. of Cultivation Manured.			Percentage of Cultivation, which being thus manured bears 2 or more crops annually.	Population per Square Mile of Cultivation.	Stock per Square Mile of Cultivation.			Amount of Manure applied per Acre.									
					Constantly.	Occasionally.	Total.			Horned cattle.	Sheep and Goats.	Others.	To Land constantly Manured.	To Land occasionally Manured.								
														Amount.	At what Intervals.							
Delhi	Delhi	25.5	Irrigated	37	27	13	40	26	631	192	64	9½	250	400	3rd or 4th year.							
			Unirrigated	63	10	5	15	2														
	Total	100	16	8	24	11	381	167								50	14	200	300	2nd year.		
	Gurgaon	28.5	Irrigated	19	19	25															44	—
			Unirrigated	81	2	2															4	—
	Total	100	5	6	11	3															482	184
Karnal	30.4	Irrigated	39	31	—	31	15															
		Unirrigated	61	—	—	—	13															
Hissar	Hissar	16.9	Irrigated	5	2.85	7.06	9.91	14.90	242	67	40	10	500	200	Half yearly.							
			Unirrigated	95	—	—	—	1.16														
	Total	100	0.16	0.38	0.54	0.89	574	160								37	10	600	450	3rd year.		
	Rohtak	19.2	Irrigated	13	11	56															67	8.5
			Unirrigated	87	15	23															38	9
	Total	100	2	7	9	1.88															140	44
Sirsa	14.3	Irrigated	3	0.013	0.001	0.0014	—															
		Unirrigated	97	—	—	—	—															
Umballa	Umballa	35.3	Irrigated	18	50	24	74	—	695	299	86	16	300	350	4th or 5th year.							
			Unirrigated	82	8	15	23	—														
	Total	100	19	13	32	11.6	521	239								53	11	200	100	Yearly.		
	Ludhiana	25.3	Irrigated	17	53	47															100	—
			Unirrigated	83	—	1															1	—
	Total	100	9	8	17	5.55															1,999	37
Simla	65.1	Irrigated	6	—	100	100	100															
		Unirrigated	94	—	100	100	Not known															
Jullundur	Jullundur	29.8	Irrigated	33	29	30	50	36	758	362	56	18	225	112	Half yearly.							
			Unirrigated	67	—	6	6	4														
	Total	100	10	15	25	15	726	238								99	13	300 to 700	—	Before sowing.		
	Hoshiarpur	33.7	Irrigated	3	31	29															60	—
			Unirrigated	97	5.8	2.8															8.6	—
	Total	100	7	4	11	16															790	366
Kangra	125.6	Irrigated	27	41	20	61	64															
		Unirrigated	73	—	—	—	10															

MANURE AND ROTATION OF CROPS.

STATEMENT showing the proportion of Cultivated Land in the PUNJAB—continued.

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Division.	District.	Average Annual Rainfall.	Description of Cultivation.	Per cent. Irrigated and Unirrigated.	Per cent. of Cultivation Manured.			Percentage of Cultivation, which being thus manured bears 2 or more crops annually.	Population per Square Mile of Cultivation.	Stock per Square Mile of Cultivation.				Amount of Manure applied per Acre.								
					Constantly.	Occasionally.	Total.			Horned cattle.	Sheep and Goats.	Others.	To Land constantly manured.	To Land occasionally Manured.								
														Amount.	At what Intervals.							
Amritsar	Amritsar	23.1	Irrigated	39	41	20	61	27	1,018	179	44	18	Mds.	Mds.								
			Unirrigated	61	—	—	—	—								100 to 450	20 to 90	2nd or 3rd year.				
		Total	100	16.13	7.87	24	10	256											320	3rd year.		
	Sialkot	39.0	Irrigated	50	9	29	38		10	758	352	27	17	256	320						3rd year.	
			Unirrigated	50	4	7	11		2							200	250	3rd year.				
		Total	100	7	18	25	6	200	250										3rd year.			
	Gurdáspur	30.9	Irrigated	16	27	9	26			7	549	146	79	10	200					250	3rd year.	
			Unirrigated	84	8	7	15			—						200	250	3rd year.				
		Total	100	11	7	18	1	200	250	3rd year.												
Lahore	Lahore	18.5	Irrigated	37	18	10	28				10	411	95	56	10				800	200	Yearly.	
			Unirrigated	63	—	—	—				—					200	200	Yearly.				
		Total	100	6	4	10	4	200	200	Yearly.												
	Ferozepore	20.0	Irrigated	14	20	10	30				20	276	86	33	9				550	750	2nd year.	
			Unirrigated	86	—	—	—				—					200	200	2nd year.				
		Total	100	2.84	1.42	4.26	3	200	200	2nd year.												
	Gujránwála	26.3	Irrigated	70	9	3	12				1	637	180	67	12				200	200	Time of sowing.	
			Unirrigated	30	—	—	—				—					200	200	Time of sowing.				
		Total	100	7½	2½	10	0.70	200	200	Time of sowing.												
Rawalpindi	Rawalpindi	31.5	Irrigated	2	86	14	100				100	546	105	116	25				300	155	1st and 2nd year.	
			Unirrigated	98	3	3	6				3					300	155	1st and 2nd year.				
		Total	100	5	3	8	5	300	155	1st and 2nd year.												
	Jhelum	18.6	Irrigated	3	34	43	77				100	348	182	66	13½				300	120	2nd year.	
			Unirrigated	97	5	5	10				60					120	2nd year.					
		Total	100	5	7	12	69 per cent. of column 8.	120	2nd year.													
	Gujrát	29.2	Irrigated	13	20	14	34			2	560	183½	62	13	160			100	Previous to sowing.			
			Unirrigated	87	15	5	20			—						100	Previous to sowing.					
		Total	100	14	8	22	0.26	100	Previous to sowing.													
	Shahpur	13.0	Irrigated	64	2	3	5			2	857	258½	278	44	160			160	2nd or 3rd year.			
			Unirrigated	36	—	—	—			1						160	160			2nd or 3rd year.		
		Total	100	1	2	3	1	160	160	2nd or 3rd year.												
Mooltan	Mooltan	6.1	Irrigated	79	Cannot be stated.						582	171	319	23	200			—	Annually.			
			Unirrigated	21												200	—			Annually.		
		Total	100					200	—	Annually.												
	Jhang	10.3	Irrigated	69	20	7	27				5	681	625½	620	65			160 to 200	120		2nd year.	
			Unirrigated	31	—	3	3				—					120	2nd year.					
		Total	100	12	7	19	3	120	2nd year.													
	Montgomery	8.7	Irrigated	62	9	12	21			1	596	367	413	43	160			100	Ditto.			
			Unirrigated	38	—	—	—			3						100	Ditto.					
		Total	100	6	7	13	2	100	Ditto.													
	Muzaffargarh	6.1	Irrigated	65	89	—	89			Not known.	476	230	163	30	1,400			—	—			
			Unirrigated	35	—	—	—			—						—	—					
		Total	100	46	—	46	—	—	—													
Derañát	Dera I. Khan	8.0	Irrigated	32	53	—	53			Not known.	547	186	476	33	—			—	—			
			Unirrigated	68	2	—	2			—						—	—					
		Total	100	18	—	18	—	—	—													
	Dera G. Khan	7.2	Irrigated	57	6	2	8			Not known.	455	76	60	16	75			40	2nd or 3rd year.			
			Unirrigated	43	—	—	—			—						40	2nd or 3rd year.					
		Total	100	3	1	4	—	40	2nd or 3rd year.													
	Bannu	12.0	Irrigated	15	15	12	27			15	392	220	73	57	15 to 30 donkey loads.			—	Before sowing.			
			Unirrigated	85	—	—	—			—						—	Before sowing.					
		Total	100	2.22	1.78	4	2	—	Before sowing.													
Pesháwar	Pesháwar	12.9	Irrigated	25	9	15	24			38	360	95	58	7	400			320	15 or 20 days			
			Unirrigated	75	—	1	1			—						320	15 or 20 days					
		Total	100	2	4	6	10	320	15 or 20 days													
	Kohát	20.2	Irrigated	38	Cannot be stated.					976	288	337	33	300 to 400	155			Half yearly.				
			Unirrigated	62												4	300 to 400		155	Half yearly.		
		Total	100					4	300 to 400												155	Half yearly.
	Hazára	46.3	Irrigated	10	35	26	61			35	544	319	242	16	250			200				
			Unirrigated	90	12	6	18			12						200	Yearly.					
		Total	100	13	9	22	14	200	Yearly.													

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Tremenheere.

*Except Rawalpindi, the countries Trans-Indus, and the hill districts of Kot Kāngra and Simla, the face of the country may be said to be one uniformly level plain, varied only by depressions several miles in breadth forming the valleys of the five rivers which flow through the plain, and unite in Sindh. These low lands are full of fine alluvial deposit, and are enriched by partial inundations every year. They are tracts of great natural fertility, and abundance of the best water for irrigation is obtained a very few feet from the surface. The ground intermediate between one basin and the other of adjoining rivers is higher, by several feet, and comparatively dry and unproductive. Portions towards the south are either not cultivated at all, or are barren, and covered with jungle and sandy wastes; yet the soil is friable, and has, for the most, part, a fair admixture of loam and sand, requiring the command of water only to fit it for the highest cultivation. Scarcely a stone is to be found, and the land, when turned, resembles the finest garden soil. If schemes for the supply of water, which are understood to be in contemplation, and partially commenced, should be carried out, these parts of the Punjab may be made, in time, as productive as any other.

Nearing the hills, and eastward of a line drawn from the point of junction of the Sutlej and Beas rivers through Amritsar, Wazirabad and Jhelum, the whole surface is a scene of uninterrupted fertility and richness, to the base of the lowest range of hills which bound the plains to the north and east. A glance at the map will show that villages and towns are much more thickly clustered on this upper portion of the Punjab, and along the lines of rivers, than in other parts of the country.

Although these differences exist in the general aspect and natural capabilities of various parts of the Punjab, the cultivated products are much the same in all, wheat, barley, sugar-cane, maize, and millet being the staples of the whole country, with some cotton, hemp, tobacco, and vegetables of several sorts. These are grown at two distinct periods of the year, and are divided between the spring and the autumn crops, so named from the time at which they are reaped. The spring, or rabi crop, is sown in November, and reaped in May; the autumn or kharif, sown in July, and cut at the end of October. In the first, the cultivation is principally wheat and barley. In the autumn are reared sugar-cane, maize, millet, and moth, with cotton and other substances above mentioned. The native methods of cultivation exhibit a good deal of industry at some periods of which perhaps the best example is their mode of preparing the land. As many as six or seven ploughings are given before wheat or barley is sown, and for some other crops considerable pains are taken; the ground is completely pulverized. Many a disparaging remark has been made on the native plough, its simplicity and lightness, and its merely "scratching the ground;" but a little reflection will show that, under the peculiar circumstances of climate and soil it is probably the best. In England the object is to break up hard masses of mould or stiff clay, and to get rid of superfluous moisture, while here, in light and tractable soil, scarcely a clod can be seen, and to preserve, in the sub-soil, the rain and moisture it imbibes at certain periods is the cultivator's greatest care. It is evident, therefore, that deep ploughing would be unsuited to such conditions. If the surface is loosened so as to allow the delicate fibres of the roots to penetrate and to secure the free access of air, it will be sufficient; to turn up the moist soil from below, and expose it to a hot sun and drying wind, would be most injurious. When the ground is in a dry open state, the drill is used in sowing, with the object of delivering the seed deep into the soil. A piece of flat heavy wood is then drawn over the furrows to smooth them

and "keep in" the moisture. After rain, or in wet seasons, the seed is sown broad-cast.

A good deal of trouble is also taken in hand-hoeing and weeding some of the crops, as sugar-cane, maize, and the larger kind of millet; but only in the early stages of growth. Cultivation of nearly every sort is so crowded that it would be impossible to pursue this practice so long as it would be beneficial to do so, and great improvements might be made in the system, both in this and many other respects, which will be adverted to as we proceed.

The principal objects to which our inquiries were directed were to ascertain whether any regular rotation of crops is practised, and the principle on which it might be based. To what extent manure is used, in what state applied to the land, and the different substances resorted to; as well as an elucidation, generally, of the existing system of farm management in the Punjab. It is believed that this species of information, in a collective form, has never been before procured, and it may be considered interesting to publish an abstract of the replies in an appendix, under the head of each question to which the information refers. They have been, therefore, arranged in this manner, so that a judgment may be formed of the correctness of the inference deduced in this report, as well as on the value of the suggestions offered.

The point of first importance relates to the succession of crops, and it has been clearly elicited that no regular rotation, nor any system whatever of changes for the relief or improvement of the soil, exists. The same crops succeed each other year after year, on the same ground, and generally both of grain within twelve months. The rabi is no sooner removed than the kharif is sown; one or the other is occasionally omitted, and the ground left fallow for half, sometimes for all the year, but if no manure has been used, the same crops are annually grown; wheat and millet, wheat or barley and moth, alternately, within the same twelve months, and this invariably where the land is not artificially irrigated.

Near wells a certain system of changes is followed, but this is owing principally to the use of manure, which is almost exclusively confined to irrigated lands, and it is more to give the following crop some advantage from the dressing which has been applied to the preceding one, than from any acknowledged principle of varying the products taken from the land.

Thus maize, the larger kind of millet, and sugar-cane are both irrigated and manured, and it is customary to take a crop of wheat or barley in succession to those, which always proves a good one. On irrigated lands, which comprise probably not more than one-fifth of the area of the country, a crop of Indian corn is taken when first brought under cultivation, after which the ground is prepared for sugar-cane, frequently ploughed, and well manured. The cuttings are generally planted in March, and the crop is not cleared till February. Indian corn again succeeds at the next kharif, after which wheat, or if desired, a second crop of sugar-cane can be again laid down. This, however does not succeed wheat, but is always after maize. Again, cotton is sown in April and cleared in December, when it is succeeded by maithee for fodder; then maize at the succeeding kharif, after which ground will be fit for sugar-cane, and lastly wheat. The last three are manured, but cotton not so. But the absence of any definite rotation on true principles is fully established.

The cultivation, near villages and wells, consists of sugar-cane, maize, joar, cotton, and tobacco, valuable products, which cannot be brought to any perfection without manure. It is not available in sufficient quantities to fertilize the general face of the country; so that for wheat and barley it is very sparingly used and generally not at all for these, and other crops, over any considerable extent of land. The substances collected are cowdung and other animal excrement, litter, vegetable refuse, ashes, rubbish, sweepings of houses, and of yards. These are kept in heaps out-

side the villages, and exposed to the weather for a considerable time before being applied as manure to the land. After one or two years, but without any definite rule, it is spread on the field at the time of ploughing. It is not thought fit for use till it has been allowed to ferment a year, but, on the other hand, it is often carried out before the straw and other substances have had time to decay. In either case it is unfit for the land, and on examination of some has shown that not more than 40 per cent. of its bulk is calculated to afford any nourishment to the growing crop. After a 12 months' exposure to a tropical sun and rains, little of its fertilizing properties remain, the nitrogen and ammonia from animal substances, most essential to vegetation, must have been long before expelled. To sugar-cane, maize, and joar a top dressing is given when the plants are young, which is advantageous, but the principle of saving or economizing manure, and applying it in the best state, is most imperfectly appreciated, if at all. Many substances, as bone dust, lime, and others might be pointed out as available, and within the native cultivator's means and reach, to add to the exuberance of his crops; but this belongs more to a system of high farming than to a general review of the state of agriculture of this country as it now exists.

We consider it better, for the present, to abstain from such details, and to endeavour to point out the radical defects of general management. It appears that the scanty supply of ordinary manure is one of the foremost of these, and this is so intimately connected with a proper rotation of crops, that the two considerations can scarcely be separated. A further supply can only be derived, first, from the land; secondarily, from the cattle which feed on and elaborate the vegetable substances which the land has produced. No increase can occur unless land is set apart for its production. Green substances must be grown and cut continually, or roots reared for the food of cattle, which will yield manure, for it is only such substances as are consumed by them which return to and enrich the soil. Lands in the rabi, as well as the kharif, should be devoted to this purpose, and the "racking" system of wheat every year from the same ground should be abandoned. It is certain that land treated in that manner must be greatly impoverished, and it is extraordinary that blight and famine have not been produced. If turnips, mangold

wurzel, lucerne, or other suitable crops, are allowed to take their turn in cultivation, the increase of wheat, barley, or other grains, in any single harvest would be soon apparent; the produce of one season would probably exceed what it now is for two years from the same land under the present exhausting system.

But to grow more green crops and other fodder will not be sufficient so long as the careless practice remains of keeping the cattle without any economy of the manure they yield, which is a necessary consequence.

They stand, for the most part, under trees which surround the wells at which they work, instead of being kept under sheds, where litter could be usefully mixed with their dung and nothing lost. With an increase of the means of subsisting them, their numbers would increase, more land could be ploughed, and a system pursued which would be advantageous in every respect.

The point which seems next to demand attention is the excessively crowded state of all the crops. As they advance to maturity the plants are as thick as they can possibly grow, and much too close to one another to arrive at any perfection. It is impossible to observe the tangled mass of sugar-cane, the thick and scarcely penetrable fields of maize and millet, without being satisfied that each plant can neither derive sufficient nourishment from the soil, nor its proper share of light and air from above. The natural results are everywhere evident, the cane is thin and attenuated. Some of the heads of millet rise up and expand to their full size; but by far the greater number are small, low, and stunted. With maize it is much the same. The sure and only remedy for this error is to plant in rows, sufficiently far apart to allow of hoeing and weeding by the use of the plough; this method of cleaning the ground is simple, efficacious, and saves a great amount of manual labour; turning the soil near the roots during several periods of growth is most beneficial to the crop; weeds are readily and effectively removed, and every plant has room to attain its full development. This is no new suggestion. In the cultivation of maize especially, it is practised in America, in France, and other countries where land is very valuable, and has been found to answer well. There can be little doubt that it would be successful here.

NORTH-WESTERN PROVINCES.

The most widespread system of cultivation in the North-Western Provinces and Oudh is that which divides the village area into three circles, the village site being the centre. The circle nearest the site or homestead (known as Bara, Goind, or Gauhan) is always manured, and in it the most valuable and exhausting crops are grown. The middle circle (known as the Manjha) is usually manured every other year. These two circles contain, roughly speaking, about 5 and 20 per cent. respectively of the cultivated area. The third or outlying tract only gets manure occasionally, whenever the cultivator can spare any; but it is also a common practice to pen sheep and cattle out in these fields for the night during the dry season of the year. Perhaps about 5 per cent. of the area of this tract is manured in this way every year. Thus the total area manured in any ordinary year is about a fifth of the entire cultivated area; one-twentieth part receives manure every year; one-fifth receives it every other year; and three-quarters receive it once in 10 or 15 years.

2. There are, however, several local exceptions to this system which deserve to be noticed. In the Meerut and Rohilkund divisions, wherever the land is owned by that excellent cultivating caste, the Jats, the practice is during each year to carry all the

manure to a different side of the village area, from the site right up to the boundary, and thus to manure every field in the village in turn during a course of four or five years. In the hill tracts, leaves and brushwood are trampled or ploughed into the small terraced fields to serve as manure. In the Sub-Himalayan Districts, from Dehra Dun to Gorakhpur, where the population is more scanty and the soil has been more recently brought under the plough, manure is less carefully collected and less abundantly applied than in the rest of the north part of the Gangetic Plain. South of the Jumna, in Bundelcund, the land is of a different character; it is mainly a black adhesive soil, the detritus of laterite, and is considered not to stand in need of, or to be improved by, manure; and, except for the purposes of raising garden crops, none is given to it.

3. The quantity of manure given to an acre of land depends mainly on the crop that it is proposed to raise. For ordinary crops the average appears to be about 4 or 5 tons per acre (see Mr. Wright's estimate in page 18 of his Agricultural Memo., and the district replies generally tend to coincide with this), but garden crops generally receive about 10 or 15 tons; for sugar-cane, it is reckoned that 20 tons are generally applied, and Mr. Wright's calculations go as high as 30 tons; while for

* Extracts from a paper on the agriculture of the Punjab, furnished to the Agri-Horticultural Society of Lahore, in September 1852, by Lieutenant-Colonel Tremenhreere, of the Bengal Engineers.

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NORTH-
WESTERN
PROVINCES.Mr. Buck and
Mr. Elliott.

the high cultivation round Farukhabad, it has been estimated that as much as 40 tons are occasionally laid on an acre. But this must be looked on as a very exceptional case.

4. Evidence of the value set on manure in the highly cultivated central parts of the Gangetic Plain may be found in a custom of almost universal prevalence, under which an agriculturist who lives in one village, and cultivates land in another, is not allowed to remove the manure of his own cattle-shed from the area of the village in which his house is situated to the land he cultivates outside that area.

5. The crops for the raising of which the land is always manured are garden crops (including potatoes, tobacco), and opium, sugar-cane and maize. In most cases, however, the manure that is given for one crop is not exhausted by it, but a second crop follows on the same land without the application of fresh manure. Thus maize and sugar-cane are generally followed by wheat. Wheat is hardly ever grown without manure, but often it is not the wheat itself, but the rain crop that precedes it, that is manured. Barley, though less generally, gets manure in the same way. Cotton and indigo are commonly manured, but not always; they are neither of them exhausting crops, as they are not surface feeders, but have taproots which run down to the sub-soil and obtain their nutriment where ordinary cereals do not penetrate. Cotton is sometimes grown without manure in outlying land as a reclaiming crop, since its leaves in falling fertilise the ground. Indigo also is often unmanured where canal water is abundant, and is then followed immediately by wheat; but this system is found to be exhausting to the soil. For the rest, if other crops get manure, it is given not so much for the sake of raising those particular crops as for the sake of the land, which every good cultivator desires to manure in its turn as often as his means permit.

6. The chief ways in which land is manured in this province are thus described by Mr. Buck:—

- (1.) From the farmyard muck-heap.
- (2.) By human excreta.
- (3.) By the herding of cattle or sheep.
- (4.) By various nitrates.
- (5.) By the refuse, leaves, or roots, of a previous crop.

These methods are thus described by him in detail.

7. The principal ingredient in the farmyard muck-heap is the dung of the cultivator's cattle, of which, however, only that part is used for manure which is collected during the rains, when the moisture of the atmosphere does not permit of its being dried. In all other months the dung is made up into round flat cakes and used or sold as fuel. The consequent loss of manure to the land is one of the stock complaints against Indian agriculture, and need not be noticed here at length. Suffice it to say that it has been proved by actual inquiry that in the neighbourhood of a town far more can be realised by the sale of these dung-cakes than from the increase in produce which would result from their application to land; and even in villages more distant from large centres of consumption their price (the best estimate we have of their utility as fuel) is generally high enough to counter-balance the advantages which could be gained from using them as manure, especially when to the ready returns of sale are contrasted the slow and uncertain returns of agriculture.

8. The heap is commenced at the end of the dry hot weather or at the beginning of the rains in a shallow saucer-like excavation somewhere in the vicinity of the cultivator's house. The open spaces near the village are generally occupied by several of the heaps in close vicinity, but each cultivator's heap is respected by the neighbours. During the rains cattle dung as well as house refuse is daily added to the heap, and as cattle are at that season more carefully housed, the quantity of dung collected per month is greater than in the rest of the year. During the remainder of the year, i.e., about eight months out of the twelve, house refuse, which always includes

cow-dung ashes, is thrown on the heap, so as to form an outer coating over the dung-mixed portion, which latter (the core of the heap) is considered by cultivators to be the most valuable part.

9. As a rule bullocks are housed without litter, although in one or two villages in the Cawnpore District it was found the practice to litter them in the cold weather with grass or refuse straw, which collects to some extent their liquid as well as their solid excrements. The objection to the practice in the rains is that, even where litter is available, it brings in snakes and insects, and is, on account of the fermentation and heat induced by the climate, injurious to the feet as well as to the general health of cattle. But the greatest objection of all is the absence of available straw or grass, the whole of which is used either as fodder or as fuel.

10. It may be roughly assumed that one-third of the dung is utilised as manure, while of the remaining two-thirds only the ashes ever reach the land. It has been estimated from experiments instituted in the department of agriculture that the dung of a yoke of bullocks collected during the rains and supplemented by house refuse is ordinarily utilised to manure half an acre of land, and that the total weight of the muck-heap ordinarily amounts to about 5 tons. This puts the amount of manure given to the acre at 10 tons, an outside estimate. There are but few available statistics of the number of cattle in different parts of the province; but in Cawnpore (which is a fairly average district, and where a census was taken at settlement) there were counted 485,787 head of cattle and 108,710 sheep and goats, giving one head of cattle and two sheep or goats to every three acres of cultivated land. According to these figures the amount of land manured by muck-heaps would come to about 10 per cent. of the whole cultivated area, if it be assumed that one head of cattle provides manure for one twelfth of an acre, and that sheep and goats increase the amount to one-eighth.

11. Since the value of bullock-dung as a manure depends on the quality of the food given to the cattle, and the latter is in these provinces usually of poor character, consisting as it does merely of chopped straw, it follows that the value of the muck-heap manure is very much less than that of the same weight of farmyard muck in Europe. The chief exception to the rule is that in cotton-growing tracts much cotton seed is utilised as cattle food, and cotton seed is one of the most valuable manure producers which exists.

12. According to the usually accepted tenets of agriculture, the system under which cattle manure is utilised is extremely defective. The whole of the liquid manure is lost; the muck-heap is exposed, while being formed, to drenching rain, and is usually spread out on the land at the hottest season of the year (April and May) and lies sometimes for weeks under a baking sun and a scorching wind.

13. Stable dung, whether of cattle, horses, or goats and sheep, as well as house refuse, is sold by the sweepers of the premises of the richer classes, or by non-cultivating residents, such as weavers, oil-pressers, (who keep a bullock to turn their oil-mill), and others, to cultivating residents of a village. The price varies in the Doab from about two annas to four annas a cart-load of half a ton.

14. As a rule, human excreta are not systematically utilised as manure. It is not the custom to cover them with earth, as is practised in some other countries, and, apart from sanitary reasons, the non-use of a deodoriser is objectionable, since by exposure excreta lose much of their manuring value. The collection of village houses in one large mass entails much loss of manure, since either the fields immediately outside it, lying in everyone's path, are, if anything, over-manured, to the exclusion of those at a little distance, or else waste land (such as the side of a pond, the ravine near a river, &c.) receives the greater part of what would otherwise be distributed in fields.

15. Although the systematic use of night soil mixed with earth or poudrette is the exception, yet in some

exceptional cases it has not been neglected. The most notable instance of this is at the city of Farukhabad. The system pursued there is described by Mr. Buck in No. I. Vol. II., of the "Revenue Reporter" of the North-Western Provinces for 1873, (page 145). In large villages where nightsoil is removed from the houses of the richer inhabitants whose women do not leave the premises, it is sold by the sweepers, who remove it to cultivators at a small price.

16. The practice of herding cattle or sheep on land chiefly obtains in those parts of the provinces where there are extensive grazing lands, and cattle are largely kept in herds. In Bijnor, the drovers are paid to herd their cattle during the rains, on land, which in the spring is used for tobacco culture; and in all other parts of the provinces, where there are droves of cattle, people are glad to pay from two to four annas for the privilege of having 100 head herded on an acre for one night. This is a well known and very effective way of manuring land, since the soil gets liquid as well as solid excrements, and it is not uncommon to see places on which cattle have been herded white with the efflorescence of nitrates resulting from the combination of ammonia with the alkalies of the soil. Tobacco is largely grown on such land in some of the Sub-Himalayan tracts. In Banda and Fatehpur sheep are grazed in large herds on the jungle land at the foot of the Central Indian table land, and are penned on fields for the purpose of manuring them. The same practice is followed throughout the province wherever there are herds of goat and sheep.

17. Liquid manure indirectly forms a most important factor in the manure supply of the province. It has been mentioned that no attempt is made by the cultivating population to secure for the land the liquid manure or urine of men or cattle. What occurs is this: cattle void their urine in yards or open spaces near the village where tethered; men do so in the fields close by, or as often as not on the side of the excavations of ponds always seen near habitations, and which generally owe their origin to the earth having been removed for building the mud walls of the houses. The liquid manure in dry weather mixes with the surface soil, and in the rains is washed, some of it into the ground, some of it into the village excavations. Much of the foul earth lying in the streets and gutters, and in which exposure to the sun and air has formed chemical compounds useful as fertilisers, is also washed to these ponds.

18. There are three ways in which the liquid manure washed into the ponds is eventually brought into contact with cultivated land as a fertiliser—

(1.) The foul water is baled on to any adjacent fields;

(2.) The mud at the bottom of the ponds is broken up and carried on to cultivated land, or is used for building and repairing walls, from which the efflorescing nitrates are scraped by cultivators;

(3.) The foul water filtrates through the soil and impregnates the neighbouring wells with nitrates and other chemical compounds.

19. The first method is a simple, well known, and direct use of liquid manure, and needs no illustration. The second is less known, and has been little noticed. Mr. Buck states, in a note written in 1874, that the walls of all large villages are carefully scraped at their foot every year by cultivators (though sometimes saltpetre-makers anticipate them), and the earth used as manure for opium, tobacco, and other valuable crops. Similarly (and especially for opium), cultivators heap up and utilize the mud at the bottom of any pond sufficiently dry. Nitrates accumulate on a wall near its base, and the practice of scraping them out in itself necessitates more mud being brought up to plaster and repair the wall. The process is therefore enhanced in its action by the addition each year of earth freshly impregnated, and the mud walls assimilate on a small scale to the saltpetre heaps of France and

Germany, which are artificially built up of earth impregnated with urine. The following is an analysis of such earth sent by Mr. Buck to Dr. Waldie, of Calcutta, for examination:

In 100 parts of earth dried at 220° Fah.

Constituents of Salt soluble in Water.	—	Constituents of Earthy Compound insoluble in Water, but soluble in Hydrochloric Acid.	—
Potassa	2.21	Alumina and oxide of iron	7.10
Soda	1.32	Magnesia	.99
Lime	1.52	Lime	2.66
Magnesia	.27	Potassa	1.00
Sulphuric acid (anhydrous)	.84	Sulphuric acid (anhydrous)	.07
Nitric acid (ditto)	2.31	Phosphoric acid (ditto)	.73
Chlorine	1.59	Carbonic acid	3.04
		Silica acid	.07
Total	10.06	Total	15.86

Silica and siliceous earth insoluble in hydrochloric acid. 70.29

Organic matter, including .025 ammonia and a little water refined by ignition. 3.79

Total - 100.

The nitric acid is equivalent to nitrate of potassa - 4.32

The chlorine is equivalent to common salt - 2.62

The phosphoric acid is equivalent to phosphate of lime or bone earth. 1.60

This is a large proportion.

In the case of the salts soluble in water a portion of the bases is combined with organic acids; these are included in the organic matter.

The earth as received consisted of earth 93.76 100.

dried at 220° Fah.

Water refilled at that temperature - 6.24 6.65

Total - 100. 106.65

20. The third way in which liquid manure finds its way to cultivated land is by filtration to wells, of which the water is used for irrigation. Almost every village possesses one or more wells, of which the value of the water for crops such as tobacco and opium is known to be exceptional, while there must be a very much larger number of which the water is valuable, although not so exceptional as to be quoted as such. The following is an analysis of water from two wells made as before by Dr. Waldie:—

Analysis of two Samples of Water.

In 100,000 parts of water.

	First sample.	Second sample.
Potassa	.46	.60
Soda	16.58	37.07
Lime	12.08	11.69
Magnesia	11.42	29.00
Peroxide of iron	1.04	.64
Sulphuric acid (anhydrous)	4.60	4.26
Nitric acid (ditto)	4.26	12.19
Chlorine	19.53	51.83
Carbonic acid in excess.		
Silica and organic matter not determined.		

These constituents may be arranged as follows: according to the general practice of chemists combining the strongest acids with the strongest bases:—

	First sample.	Second sample.
Sulphate of potassa	.84	1.12
Sulphate of soda	7.49	7.27
Nitrate of soda	6.70	19.18
Chloride of sodium (common salt)	20.49	51.26
Chloride of calcium (muriate of lime).	11.10	23.17
Chloride of magnesium (muriate of magnesia).		7.85
Carbonate of lime	11.57	—
Carbonate of magnesia	23.98	53.97
	82.17	163.82
Carbonate of iron (omitted)	1.51	.93
	83.68	164.75

The characteristics of these waters are the large quantities of nitrates, common salt, and magnesia salt.

These waters also contain a little ammonia, but in very small quantity:—

	Parts.
For the Kachi khera	·005
Parauli	·003

in 100,000. The ammonia has evidently been all oxidised and converted into nitric acid.

The common salt indicates the presence either of sea water or of animal matter, or possibly of both.

Of organic matter there seems to be very little; it has been all, or almost all, oxidised. It would be very difficult to estimate from the presence of nitrates. Of silica there is probably a little, but it was not determined. There was not a sufficient supply of water for the purpose, nor is it of much importance.

21. Manuring by refuse, leaves, &c. of previous crops is only practised on a large scale in the neighbourhood of indigo factories where the refuse stalks from the steeping vats are always collected and re-placed on the lands adjoining. The value of fallen leaves of the cotton, arhar, and some other plants is known and generally appreciated by cultivators, but the leaves are sometimes removed and used as fuel. The fallen leaves of trees are carried off from roads and fields and waste lands by grain parchers, who sweep the country as clean as a ship's deck. The stalks of all the principal crops are used as fodder, fuel, or for roofing purposes, and only stray bits find their way to the muck-heap. Green manuring is unknown. Vegetable manure is therefore sadly deficient.

Rotation of Crops.

22. The system of rotation of crops ordinarily practised is one of great simplicity and efficacy; it consists in raising alternately one of the two crops, spring and autumn (or rabi and kharif), which can be grown in the year. The cultivator begins with a kharif or autumn crop of millet (joar or bajra); he ploughs the land through two or three times in June as soon as the rain begins to fall, sows his seed, and cuts his crop in October or November. He then ploughs up the land, but sows nothing in it during that winter, nor again during the next rains; but in the next October (after it has laid fallow for nearly a year) he sows wheat or barley. He reaps this crop in March or April, and the land is ready again for an autumn crop of millet in June. Thus, out of four possible crops, he has secured two in the two years, or one each year—one being an autumn and one a spring crop. If the land is rich and manured, the two crops will be cotton and wheat; if light and sandy, bajra or some lighter millet and barley. Unless there are some special circumstances affecting the land, all the outlying part of the village area, and about half the middle circle, comprising about 80 or 85 per cent. of the cultivated area, will be treated on this system.

23. The highly-manured inner circle, and the best part of the middle tract adjoining it, will not, however, be cultivated on this system, but will be made to produce two crops in each year. This is called do-fasli, or two-crop land. The autumn crop must not be a late-growing millet like joar, but one which will ripen early enough to allow of the land being ploughed and prepared for sowing the spring crop in October or November. The most usual examples of this rotation are maize or indigo, followed by wheat or barley.

24. These are the two common systems of rotation which are applied to the ordinary land of the province, according as it is, or is not, well manured. But there are also numerous special systems applicable to peculiar conditions of the soil. One of the commonest is in the case of low-lying flooded lands where the water clears off by November. Here a coarse early rice is grown in the rainy season, cut in

September or October, and the land roughly ploughed up as it dries and gram or peas thrown in. This land is do-fasli, i.e., it raises two crops in each year; but they are both poor crops, and it is very different from the rich do-fasli land round the village site. In Bundelcund the rich sticky black soil is hardly fit to raise any crops in the rains; it grows wheat or barley year after year, and gets either a fallow or (if the rains are light) a rain crop every fifth or sixth year to restore it. Some low lands, again, which are too damp to grow ordinary millets, but not sufficiently flooded to grow rice, can only be cropped with rabi or spring crops year after year. Light sandy soils, on the other hand, will often bear a moderate rain crop, while nothing would grow there in the dry weather; such soils may be sown with kharif crops (such as bajra) for two or three years together, and then left fallow; sometimes they are so poor that after only producing one rain crop they require to be left fallow for three or four years. It has already been mentioned (paragraph 5) that where canal-water is abundant, the two-crop system of indigo followed by wheat or barley is frequently practised, even on unmanured land.

25. It remains to mention certain special instances of rotation adapted to suit peculiar localities or crops. The principal case is that of sugar-cane, which being planted in February or March and cut in December or January, occupies the ground for nearly a year, and does not fit in with the ordinary autumn and spring harvests. The highest system of cultivating sugar-cane is that which allows the land a year's fallow beforehand; a wheat or barley crop is taken off in the spring; then the land is heavily manured and constantly ploughed till next February, when the cane is sown; after it is cut a light crop of maize or millet or rice is sown, and then wheat or barley, after which the year's fallow as before; in this way, in three years the cultivator gets three crops, a sugar-cane, an autumn, and a spring crop. But now that the pressure on the land is more stringent it is not usual to allow so long a time of rest. A common rotation is to sow first a kharif crop (generally one of the smaller millets, or oil seeds, or cotton, not the heavier jowar or bajra), then sugar-cane; after that, leaving the land to rest till October, a barley or wheat crop, then a kharif crop followed by gram or peas; thus five crops are got in four years. Another method of rotation is as follows: first year, maize followed by gram; second year, fallow; third year, sugar-cane; fourth year, a fodder crop (chhari) followed by wheat; 5th year, cotton. This gives six crops in five years. It is obvious that there may be many variations in these combinations.

26. In the hill tracts fallows are more common than in the plains. In Dehra Dun it is usual to sow (1) cotton and arhar; (2) til (an oil seed) or mandwa (a millet); (3) wheat or barley; the fourth year being fallow. In Kumaon and Garhwal the same kind of rotation is practised, rice being laid down the first year instead of cotton and arhar. In the plains, in half-manured lands, a compromise is sometimes effected between the single-crop and the double-crop system; the cultivator raising three crops in two years, one in the autumn and two in the spring. The high cultivation of the market-gardening classes leads to endless variation. They generally get three and sometimes four crops out of the ground in a single year. A common method is to grow maize in the rains, following it at once with potatoes or carrots, after which in January are sown tobacco or spinach or a millet called chena. But it is unnecessary to go into minute detail in the case of crops which occupy so small a portion of the total cultivated area as these.

27. Drought frequently interferes with the ordinary system of rotation. When the kharif or rain-crop cannot be sown through the non-arrival of the summer monsoon, or when, having been sown, it withers through the premature failure of the monsoon, a large portion of the area prepared for this crop will, if the

conditions are favourable, be placed under rabi or winter crop. In this case it is frequently the custom to lay down crops which will ripen early and produce a large quantity of food, such as carrots and potatoes,

rather than the cereals which mature more slowly. And, generally speaking, if, through any cause, the kharif area is exceptionally small, it will be followed by a proportionately large rabi; and *vice versa*.

BENGAL.

The manuring and rotation of crops, as practised in Bengal, does not affect in the slightest degree the question of famine. These matters vary so widely in different districts and in different parts of the country; the use of manure is so uncommon—save for the most valuable of the non-food crops, such as indigo, sugar-cane, jute, &c.,—and the rotation of crops so seldom practised, and when practised is based upon such indefinite principles, that no precise report on the subject can be furnished. Cow-dung, which in England and other countries is given back to the soil as manure, is, in Bengal, used for fuel throughout the whole length and breadth of the land, except in forest and jungle tracts, on which cattle graze, where it is wasted. The only other available manures are—(1.) The products of each household dust-heap, comprising ashes, rice-

water, vegetable refuse, &c. The amount of manure thus collected barely suffices for one or two fields near the homestead on which some valuable garden or non-food crop is grown. (2.) For sugar-cane and other valuable and garden crops oil-cake is used. The use of bones and other animal manures is prevented by caste prejudice. As far as the great staple rice-crop of the province is concerned, all that seems necessary to secure a bumper-crop is timely and abundant rain. The use of European artificial manures is of course beyond the means of the people, even if their caste prejudices would allow it. A large portion of the Deltaic tract is well manured by the silt deposit of the annual floods of the Ganges and other large rivers.

CENTRAL PROVINCES.

Generally speaking all land used for the cultivation of sugar-cane, opium, vegetables, and garden lands is irrigated and also manured. In Jubbulpore, and in the west of Bilaspur, some areas of sugar-cane are not irrigated, but are manured. To this is to be added the patches close to the houses and village site, in which maize, gourds, and the like are raised, also some rice, jowar, and wheat lands close to the villages. As nearly as I can estimate 6 per cent. of the total area of cultivation is probably manured in each year, and most of this is constantly manured. I cannot say what is the average weight of manure allowed.

Mr. Elliott in his Hoshangabad Report has not given details, and I cannot find mention of quantities in other settlement reports.

Hoshangabad.—The rabi and kharif lands are separated by a broadly defined mark, so that the simple system of alternating the two sets of crops which is current in Upper India is impossible here. The kharif crops are always sown on a system of rotation, but not the rabi. Year after year, for 30 or 40 years, the same field will be sown with wheat, and probably this is the only soil in the world which could bear such a strain on it, without manure, rotation or fallow. When the land begins to be exhausted gram will be sown on it, and then wheat again for a year or two, and then it will be let to lie fallow. Formerly when the uncultivated land was larger in extent, the practice of throwing a field into fallow and breaking up another in its stead was more common than it is now, but this practice is still pursued with second class sorts.

Narsinghpur.—It has been remarked that the unbroken succession of wheat crops, returned by the same land is often surprising; but sometimes the soil shows signs of complete exhaustion. In these cases gram or some other of its tribe is usually substituted for wheat for two or three years. Cultivators are afraid to leave their lands fallow even for a single year, for the vacant land is immediately occupied by rank khans grass, which no exertions can eradicate till it has run its appointed time, this is in the best soils 10 or 12 years, in poorer lands proportionately less. At the expiry of this time of forced rest the land is restored to the cultivator, refreshed and re-invigorated; but so much is the long fallow feared, that landlords will take up, even at a loss, lands unexpectedly thrown out of cultivation by their tenants.

Chhindwara and Betul.—The poor burleo soil is generally sown with the oil plant termed jugni, which will grow almost anywhere, and is said to

improve the soil for any crop that may follow; hence it is often sown in exhausted soil by way of retrieving its quality. In the hilly parts of the district of course the kharif is the staple crop, but there are few villages in which there is not some land capable of raising either wheat or gram. The method of cultivation is the same as elsewhere, but from the fact of the cultivators being chiefly Gonds, and possessed of but little capital and few bullocks, the land is not generally so well prepared as it should be. It has, however, this advantage, that from the habit the Gonds have of frequently migrating, villages become deserted and the lands obtain the benefit of a fallow.

Sironcha.—In the Sironcha sub-division of Chanda joar and mung are grown together in the same field invariably. In this district the rotation crops are wheat and gram; til is generally sown in lands newly reclaimed from the jungle, but when not so mung is its rotation crop. Indian-corn is followed by joar or garden produce; sugar-cane where it is grown is followed in alternate years by rice. Both dry crop and irrigated lands when manured are seldom allowed to lie fallow if the cultivator can avoid it. When not manured, all lands are allowed to lie fallow once in four or five years.

Jubbulpore.—As regards fields not embanked, it has been said that the people neither irrigate and manure their lands, nor observe the common rules of agriculture in respect to the rotation of crops, but it is a mistake to suppose it is so. Of course irrigation is very little attended to, although there are many parts of the district where it would prove of the greatest advantage, and where water is easily procurable, as the sandy soils of Bilheri and Koombehee; but there are other parts again where the soil cracks for several feet below the surface in which irrigation would not be feasible, and if found to be feasible the expense of supplying it would so materially diminish profits that the old plan of depending on the fall of rain would be preferable. As regards manure the lands lying close to the huts or "georara" fields called "kharce" is plentiful, as wood fuel is more generally used than cow-dung cakes, and such lands always produce rich crops without requiring a fallow. In the Bijragogarh sub-division irrigation is more extensively resorted to in the cultivation of potatoes, tobacco, chilies, ginger, &c., and in other parts of the district in the production of sugar and vegetables. In the former, manure from the village sites is conveyed to more distant fields by a drain cut towards the side the land slopes

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CENTRAL
PROVINCES.
Mr. Nicholls.

called a "nat," and here it is the custom to rotate the crops by sowing wheat and gram in one year, and then jowar or tili in the next, and so on; in other parts of the district by the substitution of some kharif crop or by alsee instead of wheat, gram, or massur. Chanda.—The same land is grown with rice year after year without intermission or deterioration, and after the rice has been reaped the moist ground is often planted with mung, urd, or lakhari in the sandy soils, and with wheat, pulses, and linseed in the black soils, but this is only possible because the rice fields are yearly well manured. In some few places, where the tanks are large but sugar-cane not cultivated, a second or hot weather crop of rice, called *gimsal* is raised on the land from which the kharif rice has been cut. Sugar-cane is also grown on land just cropped with rice; but kala sata, which is the kind of cane usually cultivated, cannot be grown for more than one year on the same land. Kutuhee sata, however, may be raised in the same field for three years running. Save in soils irrigated, naturally or artificially, jowar, wheat, cotton, pulses, and oil seeds are never grown two years continuously in the same field, but are alternated with one another. No rule exists as to the order of the rotation, but it is found that jowari improves by following cotton, and suffers

by following linseed. Hemp, especially the san kind, exhausts the soil greatly, and wherever possible a field which has borne it for one year is allowed to remain fallow for the second. Pan cultivation is still more impoverishing, and after each crop the land worked is invariably given a rest of at least 18 months.

Bilaspur.—Year after year rice is produced in the same fields without any change of crop or even an occasional fallow, and yet the yield is apparently uninfluenced. Where wheat is sown it will be followed by gram or massur one year, and then perhaps by kodo, and where this is not done after four or five years the land is left fallow to recover itself. Again, cotton is often succeeded by tili or some other oil seeds, so that all through a regular rotation is adhered to, experience having taught the people that their soil is not rich enough, as in some of the Nerbudda districts, to yield steadily without a change of crop or a fallow, manure not being available as it is absorbed by the rice and sugar-cane fields.

Raipur.—The rotation of crops is, as might be supposed, utterly unknown; but as in Nagpur and Wardha, it is held that the proper crop to sow in newly broken up black soil is linseed. In Raipur this is generally followed by kodo, after which wheat or some more valuable crop is sown.

BERAR.

BERAR.
Mr. Dunlop.

The necessity of manuring is, I think, becoming more generally recognised; but so much manure is used as fuel in Berar that little of it is left for field purposes. Garden land is manured annually, dry crop land but seldom, indeed, in very many cases, not at all.

Until firewood can be more easily obtained, and is more generally used, the manuring of dry crop land will be neglected. An attempt was made in the vicinity of the Model Farm in the Akola District to get the people to use bones and poudrette* as manure, but the idea was not taken up.

Colonel Elphinstone in his Settlement Report on the Mehkar District, dated 1868; notices the following custom, which he observed in that part of the province:—

"That some of the intelligent cultivators are alive to the advantages of assisting the soil is evident from their sowing occasionally in land which is becoming impoverished, a crop of 'tag' or flax, which is allowed to reach a height of 2 or 3 feet, and is then ploughed into the land to form manure. But those I noticed doing so adopted the plan only in their sugar-cane plantations. They considered it too troublesome and expensive to be applied to dry crop land."

The same officer in his Settlement Report on the Pusad Taluka recorded the following observations:—

"The system of agriculture pursued by the natives is of the same primitive nature as that practised in other parts of Berar, but I have noticed here the very general use of that useful manure, the ashes of jowari stubble, and of cotton stalks, which I have not found so generally in use elsewhere."

Information is not obtainable regarding the quantity of manure generally applied per acre. I quote here Major Szczepanski's reply in regard to the Wun District. It cannot be considered applicable to the whole province:—

"Both rabi and kharif crops require manure every alternate year. Irrigated land alone is manured annually; one acre requires 10 cart loads, or 7,200 lbs. of manure."

Amraoti District, Lieut.-Col. Menzies.—Cultivation commences with sowing cotton, jowari, or gram, and these crops follow in succession. Kharif land is sown with either cotton or jowari for two years, and then wheat follows.

Ellichpur District, Major Mackenzie.—"Kharif crops, cotton and jowari alternately. Rabi crops, wheat and gram or ulsee."

Wun District, Major Szczepanski.—The custom in this district is that when new land is broken up it is sown with til (gingelly) the first year, cotton the second year, and jowari the third year. If the land is of superior quality, ulsee or some other rabi crop is sown in the fourth year. Otherwise cotton and jowari are sown alternately. Sometimes jowari with tur in one year, and cotton with ambadee (hemp) in the next.

In land of superior quality jowari, cotton, and rabi (wheat, alsee, or gram) are sown alternately. In heavy stony soils til (gingelly) and jowari are sown alternately. The land is not allowed to remain fallow.

The system of rotation prevails everywhere in respect to dry crop lands. The details of it vary in different districts as shown above, but, generally speaking, it is in light soil—one cotton, two jowari, three tur or some other autumn crop. And in good black soil suited for cold weather crops, one wheat, two gram or alsee, and an occasional crop of jowari or cotton.

It is to this system of rotation that the good preservation of land in Berar is in a great measure attributable.

* Prepared in the jails.

BOMBAY.

BOMBAY.
Mr. Peile.

The collectors furnish the following reports:—

Kaira.—Statistics not available. The ordinary quantity of manure put down believed to be $8\frac{1}{2}$ to 9 tons per acre. Sugar-cane requires 20 tons to the acre. There is no regular system of rotation of crops.

Broach.—Cotton is grown on the same land only once in three years. Jowari requires either a year's fallow or pulse in rotation.

Surat.—Only rice and garden crops are regularly manured. If any is left it is put on the jowari, cotton, or wheat land. Wheat is usually manured 5 cart-loads ($2\frac{1}{2}$ tons) to the bigha, rice gets 25 loads to the bigha, jowari, and cotton from 10 to 15 loads. Jowari and cotton are often sown in rotation, rice year after year in the same fields.

Colaba.—Little or nothing is done in the way of

manuring. Rice patches are manured by burning on them dead leaves and grass before sowing. The land is cultivated for three years, and left fallow for three in turn.

Khawdesh.—No portion of the land is constantly manured. Twenty cart-loads per acre is the usual rate for ordinary dry crops, and as much as 50 cart-loads for sugar-cane. There is a fairly uniform rotation of (1) cotton, (2) jowari or bajra, (3) rabi.

Nassick.—Only land devoted to sugar-cane and vegetables is manured as a rule. The ryot generally puts on all the manure he can get. Sugar-cane is grown once in four years. No other strict rotation observed.

Ahmednagar.—Manure is nowhere largely employed. When the rainfall is scanty manure is said to cause the crops to wither. There is no rotation except the interchange of wheat and gram. Manure is used only for garden crops and sugar-cane.

Poona.—Irrigated crops generally, especially sugar-cane, vegetables, &c. are manured yearly. Sugar-cane requires 100 cart-loads per acre and potato crops 25 loads. There is no fallow in rice or garden lands. In dry crop lands, where wheat and nagli are cultivated, three years fallow after three years cultivation. No rotation is practised as a rule.

Sholapur.—Manure is little used for dry crops. There is no rotation, but if possible a kharif and rabi crop is alternated.

Kaladgi.—All irrigated land, except rice land, is yearly manured. Dry crop land sown with kharif is also manured, red soil yearly, and the rest once in three years if possible. Probably one-eighth of the kharif land is manured yearly. The weight of manure varies with the quality of the land, from 600 maunds per acre on poor lands in the north to 200 or 300 maunds on richer land in the south. There is no regular rotation of crops, except that land sown with cotton one year is sown with jowari, wheat, or gram the next.

Canara.—As much manure is put on as can be got. For an acre 50 head-loads of 84 lbs. of cowdung, leaves, &c. are considered proper. There is no customary rotation of grain crops. Sugar-cane is only sown once in three years.

Thana.—Garden and vegetable crops are manured. Rice and nagli are manured with ashes in the nurseries before transplantation. Rice is grown year after year on the same land without fallow. Nagli requires one year's fallow.

Satara.—The best garden land producing sugar-cane, turmeric, betel leaves, vegetables, and fruits is constantly manured. The weight of manure per acre is 4,000 lbs. For ordinary garden land 1,600 lbs. suffice. Dry crop lands are generally manured every fourth year with 1,000 lbs. of manure. When both

kharif and rabi crops are grown they are grown in rotation; when kharif only there is no fixed principle. In kumri cultivation the ground is allowed to lie fallow six, seven, and even 12 years.

Ratnagari.—All the rice lands and about half the warkas lands are heavily manured every year, but the weight of manure cannot be stated. It may be said that, kharif excepted, all the crops require manure, and will not mature without it. The manure consists, on rice lands and on warkas, so far as the manure will go, (1) of dried cowdung crumbled over the surface, (2) of a layer of grass, leaves, and boughs of brushwood (called rāb), which is burnt at the end of the hot season, and then ploughed in all lands except the worst hill or warkas land.

Mr. Robertson, Commissioner, Central Division.—As a rule, no land far from the village is manured. Only irrigated lands are manured. The further a field is from the village the less chance of its ever receiving any manure. There is no fixed quantity per acre. A cultivator collects all the ashes, refuse, and dung he can, and his land just gets what he has collected. It is only the well-to-do cultivator who purchases any manure. There is so little firewood available that all the cowdung is made up into cakes and used as fuel. The system of fallow does not exist.

Colonel W. C. Anderson.—I cannot say what proportion of the cultivated soil is manured yearly, this varies in different localities according to the nature of the soil. As a general rule, in the centre and south of the Bombay Presidency all irrigated land is manured, and if after manuring the irrigated land any manure is still available it is applied to the dry crop land, commonly to red gravelly and sandy soils, and less often to black cotton soil. The use of manure is only limited by the supply. The quantity of manure varies with the nature of the crop. As much as 40 two-bullock cart-loads is commonly applied for sugar-cane and 10 cart-loads for rice to the acre. Dry crop land would never get more than 10 cart-loads. A cart may possibly carry 4 or 5 cwt. at most, as manure is loose and bulky in proportion to weight.

A rotation of crops is generally adopted. Sugar-cane is grown on the same land once in three or four years, and rice in the other years in rice districts, followed as a second crop by wheat, gram, or some kind of pulse. In the South Maratha Country cotton is grown one year in three, and jowari and wheat in the other years, with oil seeds intermixed in rows. It is not the custom to leave land fallow except in the very moist country near the Ghats, where fallows of one or even up to two years in three are allowed, unless manure is available.

Guzerat.—The white soils are, to the extent to which manure is procurable, pretty constantly manured. The lands irrigated from wells, growing sugar, tobacco, and other valuable crops, get yearly as much as 30 loads, or 15 tons, to the acre. The dry-crop lands, especially those at a distance from the village, get only what manure can be spared. Perhaps a good cultivator will give such a field growing bajra, toor, &c., 10 loads a year per acre, or 20 loads every second or third year.

The black soils are supposed to need manuring less than the white. Generally, the fields near the village are constantly and freely manured; those at a distance get little, but are often (though not now so generally as formerly) fallowed in lieu of manuring.

As regards rotation of crops and fallows, the system varies so much in different localities that it is not easy to give an account of it within reasonable limits. Speaking generally, the people do not think it well to grow the same crop two years running; though I know places (especially in the deep black soils of

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Surat) where jowar has been grown year after year with little manure or fallow for, the people say, generations. In the white soils the crops are mostly kharif or early bajra (the ordinary food grain), pulses, toor, mung, and the like, and oils, tilli, safflower, &c.; and the common rotation is bajra, pulse, and another crop in three years. In the black soils the crops are more commonly "rabi"—wheat, jowar, and cotton (which is considered "kharif" because sown early, though it is harvested late); and the usual rotation is of two years—cotton and wheat or jowar; or of three years jowar, cotton, and wheat. In irrigated lands sugar is generally grown once in three years; with wheat or barley, pepper or vegetables, in the intervening two years. Tobacco, where manure is abundant, is often grown continuously for two or three years; and then a dry crop.

In Broach the rotation of fallows used to be very regular, and the villages were divided into "khanam" or "bhadool," according as the fallow was given once in five or once in four years. But I believe that of

Mr. Pedde

CHAP. I. QN. 6. late years, since land and its produce has become so much more valuable, a regular system of fallowing has been almost entirely discontinued. A field is only fallowed occasionally, when it shows signs of great exhaustion and the owner cannot manure it.

Khandesh is a very large province, and there are great differences in the system of cultivation in various parts of it. In the black soils, cotton, wheat, and jowar are the chief staples, and the rotation is of two or three years accordingly. On the uplands the crops are mostly kharif, and the bajri, tūr, &c. are grown in no particular rotation, bajri being mostly grown every other year. Manure is by no means plentiful in Khandesh. Usually, the fields watered from wells, and those near the villages are well manured: while the outlying dry-crop lands get little manure, and only an occasional fallow.

In the black soils of Nasik, wheat and jowar are the chief staples, and are commonly grown alternately.

In the lands irrigated from rivers in the western parts of Khandesh and Nasik there is a very regular system of rotation, usually either of three years—rice, sugar, wheat; or of four—rice, sugar, wheat, and a dry crop. The land is very heavily manured, with 30 or 40 loads to the acre, in the year in which the sugar is planted. In villages having river-irrigated

lands almost all manure is given to that land, and the dry-crop lands get little manure, and are carelessly cultivated.

The system of cultivation in the Konkan is quite a different one. The lowlands grow rice almost exclusively, with occasionally a second crop of some pulse; the uplands, the common food-grains—nagli, harik, &c. There is no system of rotation. The same land always grows rice or whatever the crop is, and the rice lands are never fallowed. But the uplands are generally fallowed occasionally; and with some of the worst hill-lands a fallow of three or four years follows one or two years cropping. All these crops are transplanted, and are manured on the system known as *rab*. The spot selected for sowing—generally about one-eighth of the area of the field—is, about March, plastered over thickly with the dung of animals, then covered with leaves and rubbish and twigs or branches above, and a layer of finely-screened earth above all. The whole is then set fire to, and allowed to smoulder away, leaving a thick ash, which is lightly ploughed in at the beginning of the rains, and the seed sown. Next year another spot is selected for sowing; and thus all the land gets thoroughly manured once in 8 or 10 years.

SINDH.

Col. Haig.

Land devoted to such crops as sugar-cane, tobacco, hemp, vegetables, &c. is manured yearly and heavily, about 20 to 25 tons to the acre. In the case of wheat manuring is usually confined to a top-dressing. Land cultivated with the common cereals, joari, &c., and in the vicinity of villages or hamlets, is generally manured, but not heavily, perhaps about 10 tons to the acre. The proportion of manured to unmanured land is exceedingly small. I hesitate to estimate what it may be.

SINDH.

In kharif lands fallows are ordinarily given in the proportion of two years to one of cultivation; but when land is of poor quality three and even four years fallows are thought necessary. A rotation of crops is customary in lands of the class described in the beginning of the preceding paragraph. In other lands there is sometimes a rotation of rice and joari, of joari and wheat, &c.

MADRAS.

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The very great diversity of practice in the different districts, and the uncertainty as to the value of the information supplied in many cases, renders it difficult to answer this question categorically. Two statements have been compiled—one, in the appendix, from the replies received in 1865 to proceedings of the Board calling for reports on the system of agriculture prevailing throughout the Presidency, the other, which is given as an annexure, is an attempt to tabulate the information now received with special reference to the question under reply. As usual the collectors' replies are given in full in the appendix, and a few quotations will be made here. Writing of Chingleput, Mr. Price says: "Nearly the whole of the area of cultivable ground is manured every year. The exception is principally in the case of virgin soil and that which has lain fallow, and then it is only dry land which is thus treated. Wet land is invariably manured; under the Red Hills Tank, where manure is brought from Madras and where there is more farming than elsewhere, the proportion, as I ascertained when there some time ago, is about one ton of strong manure per acre and half to three-fourths of a ton of leaves and weeds. The manure is ploughed in and the green stuff put on afterwards and trodden in. Where the manure is inferior, about 1½ to 2 tons per acre appears to be the allowance accompanied by the same quantity of leaves as mentioned above. In dry lands the quantity of manure is less than on wet, and from what I can make out is not much more than half a ton per acre. * * * * *

MADRAS.

"Another mode of manuring, which is very much in vogue for *ragi* and other dry crops, is to put a flock of sheep or goats on it for five or six nights and then manure lightly."

The Board attach great importance to this reply as the result of inquiries personally made by an officer who has no theory to support, and yet does not accept without scrutiny any assertion which a ryot may choose to make on a subject with regard to which it is by no means easy to extract definite information. Chingleput is a poor district, but its vicinity to the town of Madras affords exceptional facilities for the purchase of manure and a ready market for produce. Turning to Tanjore, a rich district, the Board find it stated by Mr. Webster: "Very nearly the whole of the cultivated area of this district is manured year by year or once in two or three years. Two and a half tons per acre is the quantity used on lands manured annually, and about double that amount for lands manured every two or three years." It is to be noted, however, that the alleged universality of the practice of manuring is not borne out by the report submitted in 1865.

From Bellary Mr. Gordon reports; "About one-sixth of the cultivated area is annually manured, i.e., well cultivation and garden land invariably, other wet cultivation almost invariably, and the dry lands close to the villages.

"For well cultivation cow-dung refuse and leaves are used at the rate of up to 225 cwt. per acre for each crop.

"For wet cultivation other than that under wells

about 45 cwt. of leaves and rubbish for each crop is the average. The best manure, however, is sheep droppings procured by folding sheep or four or five days or more on the land. The weight of manure per acre is difficult to estimate. One thousand sheep folded for three nights on one acre would manure it amply."

The Sub-Collector of Madura, Mr. Martin, writes: "Wet crops are manured annually over almost the whole cultivable area at the rate of 3 to 5 tons per acre. The per-centage of dry land manured has not been satisfactorily ascertained, and the manuring consists in the majority of cases in nothing but the tethering of the village herd for a very short time on the land. The constantly-manured lands are principally those so manured, and the weight allowed is about half a ton an acre."

The extent to which manuring is carried on in the Coimbatore District is fully discussed in paragraphs 151 to 167 of the Annual Report of the Superintendent of Government Farms for the year 1875-76, and the conclusion Mr. Robertson comes to is that 75 per cent. at the least of the occupied land is never influenced by manure, and that part of the remainder is manured in an unsatisfactory way.

Regarding the Salem District, Mr. Puckle wrote in 1865, in submitting the preliminary settlement report: "Manuring is a serious expense in Salem, and the usual method of applying it is to tread in leaves on wet land and to pen out sheep on dry. The fields are manured to the full extent of the ryot's means. I have lately passed through villages where the irrigated lands were being prepared for planting, and have noticed the immense quantities of vegetable manure applied. One hundred and twenty bundles of wild indigo or other leaves is about the average per acre, and this quantity is annually trodden into all fields thought worth manuring * * * * *

The dry lands are manured by sheep wherever practicable." It will be observed that in this last extract there are three qualifications. The manuring is limited by the ryot's means, and by his opinion as to a field's being worth manuring, and dry land is only manured by sheep wherever practicable. The Board consider that these qualifications are generally applicable and must be fully allowed for when considering such of the replies in the appendix as testify to a more liberal use of manure than is reported in the extracts above given.

Speaking of the presidency generally, the Board would say that the common practice seems to be to manure seed beds and garden or well crops liberally, to give such paddy lands as are not amply manured by river silt from 1 to 3 tons of cattle or sheep-dung, village ashes, and leaves, the leaves preponderating in most districts, and to pen sheep on unirrigated land to the utmost extent compatible with the number of sheep available for the purpose. Attention not having hitherto been specially directed to the point, the Board cannot rely on the quinquennial returns of the number of sheep and goats in the different districts, and they are therefore of opinion that any calculation of the extent of dry land manuring based on these returns would only be misleading. There seems, however, to be reason to believe that much of the unirrigated land of the presidency receives little or no manure, and in many districts there is still such an abundance of waste land available that the ryots find it more profitable to relinquish exhausted land and take up either virgin soil or fields which have received several years of rest. Besides these relinquishments of inferior land, which has no market value, about 2,000,000 acres of the unirrigated land held on putta is annually left uncultivated, though the assessment continues to be paid thereon.

The above general statement of what may be considered to be common to districts in which much diversity of practice prevails must not be supposed to represent the maximum extent to which manuring is carried on under the most favourable circumstances.

Facilities for manuring vary in different districts and in different parts of the same district, and one ryot has more energy or more knowledge than another. The manure directly applied to irrigated land is supplemented by the silt deposited by the water used in irrigation. Indigo vat refuse is used where the manufacture of indigo is carried on; sweepings and rubbish form a larger proportion of the manure used in the neighbourhood of towns than they do elsewhere; and vegetable manure generally is much more abundantly used on the West Coast than in the more arid central districts. "Silt from tank and river beds is a favourite manure in some localities, and the use of oil-cake refuse is tolerably widespread. The ryots of Canara thoroughly appreciate the value of the urine as well as the dung of their somewhat scanty stock of cattle, and even the use of night-soil and green-manuring would seem to be not altogether unknown.

On the other hand, there can be no doubt that, besides the limitation of manuring by the ryot's want of means, there are many cases in which the most is not made of valuable manures close at hand. The lamentable waste of cattle dung as fuel is probably owing to pressing financial considerations coupled with a conservative clinging to the large consumption of fuel for domestic purposes which obtained when jungle was more abundant and fire-wood cheaper, but ignorance, prejudice, and apathy are apparent both in the general failure to make use of cattle urine, human excreta, &c., which are ready to hand, and in the absence of any widespread attempt to introduce new manures or increase the quantity now available.

It seems to be generally recognised that a special exhaustive crop like sugar-cane cannot be grown continuously on the same land, but it may be said generally that there is no rotation of crops practiced in the sense of alternating exhaustive and restorative crops. In the Godavari District, however, it is not an uncommon practice to grow hemp on irrigated land to be fed off by cattle. Different kinds of cereals often take the place of each other, and a pulse frequently follows a cereal, but it is more the convenience of the cultivator than the capabilities of the soil that seems to be considered.

The only system of fallows which prevails is the practice alluded to above of relinquishing land or leaving it waste for a term.

A DESCRIPTION of the AGRICULTURAL PRACTICE in the several districts of the MADRAS PRESIDENCY in regard to the system of rotation of crops, fallows, and manuring lands.*

Description of the system of Fallows, rotation of Crops, and Manuring.

Vizagapatam.—With the exception of sugar-cane, which is never grown on the same land for two years running, the practice of rotation of crops is not followed in this district. The ryot does not appreciate the theory that crops of the same kind on the same land every year have an exhaustive effect, and that the remedy lies in a system of rotation of crops. Lands are occasionally left fallow, but never for more than one year. When so left fallow it is generally devoted to pasturage for ploughing cattle. The fertility of the soil is maintained by manuring and ploughing. The manures are chiefly cowdung, wood ashes, refuse of indigo vats, and oil mills, but the most effectual manures are the droppings of sheep and goats, which are secured by penning the flocks at night on the land requiring to be manured. For this the shepherds charge from eight annas to a rupee a day, according to the number of the flock. A fortnight or so before the cultivation season of each description of crop comes round, manuring generally

* Compiled from replies of Collectors received with reference to Board's proceedings, dated 27th June 1865, No. 3,553.

CHAP. I. QN. 6. takes place; for paddy lands little or nothing is used, but for the paddy seed beds, and for other cereals, all the above-mentioned manures are more or less used.

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Kistna.—A piece of land is occupied as a betel garden for three years, and is then abandoned for another.

Except as mentioned above, lands are not left fallow with the object of giving them rest. They are manured by leaving cattle upon them, and if after being manured in this manner for years they become unprofitable, they are generally abandoned or allowed to lie waste for four or five years.

Wet lands irrigated by the Kistna, as a rule, do not require manure, owing to the immense amount of fertilizing deposit in the water.

Nellore.—The principles of rotation are best understood and most carefully practised in the north, where the south-west monsoon gives more months than the other ryots have for the cultivation of the land, and there varigu is rotated with the other crops, which again are themselves rotated, elsewhere paira jonna is the crop rotated.

In some of the rich Regada lands rotation and manuring are enough to secure good crops without much fallowing. On the red soils, fallows are common. But it would be difficult to assign any fixed periods for fallows. And in fact in the inland taluks, where these red soils chiefly occur, their cultivation can scarcely be called cultivation in the usual acceptance of the term. It is more a speculation for the cattle.

As regards manuring. In the haphazard cultivation of the red soils, as might be imagined, manure is unknown. The whole of the manure that can be scraped together is there put in the gardens. In the north, the varigu fields are manured and ploughed as carefully as in England, and elsewhere all the manure goes to the rice, the manure used in every instance being everything that the ryots can lay their hands on for the purpose, and often cattle are penned on the land.

Cuddapah.—As regards rotation of crops, there is no established system amongst the cultivating classes. But the principle of not straining the resources of the soil injuriously far is fully understood, and a crop requiring little nourishment always succeeds an exhausting crop, thus ragi will be sown after sugar-cane, cotton, and indigo.

Dry lands are allowed to be fallow, sometimes for long periods. Ryots will take land, cultivate and exhaust it in two or three years, and then throw it up for five or six. The lands they retain they will sometimes allow to lie fallow for a year after cotton, and they always give it a year's rest after two or three crops of cholam have been harvested from it. They never suffer wet land to lie fallow.

Manuring is well understood in this district. Every ryot keeps a heap of farmyard manure near his house, and he pollards all the trees in his holding for the leaves and branches. The leaf manure he uses for wet lands, laying it down in considerable quantities after the land is ploughed. The leaves are quite fresh and recently cut. They ferment and decay in the soil. The ryots even buy leaves for manure. They are generally leaves of neem and trees other than fruit-bearing trees. The ryots also use extensively the refuse of the indigo vats for manure. The farmyard manure is applied to dry soils and to garden lands. It is stored carefully and bratties for fuel are not so exclusively used in this as in other districts.

The system of heavy manuring is no doubt found to pay. In the immediate vicinity of the town of Cuddapah two-crop paddy land of an ordinary quality is looked upon as yielding a clear profit of from 100 to 150 Rs. a year, and cholam cultivation on black soil is not much less remunerative. Indigo cultivated on red soil will give a clear 100 Rs. an acre. The profits on cotton vary with the prices, but they have been good.

Bellary.—The productive powers of wet lands for the above-mentioned crops is maintained by manuring them with the contents of dung hills, in which are amassed* house sweepings, cowdung, ashes, and other refuse, by ploughing into the ground leaves and branches of different kinds of trees, especially of those noted below,† as also of *manumulu*, a kind of bean (*Dolichos lablab*) which is purposely grown in the land intended for paddy, and after the former is reaped, the stump creepers and the remains are forced in by a plough and then moistened to fertilize the soil, and lastly flocks of sheep are folded at night on the land for four or five nights.

There is no system of rotation with paddy observed. The early or kartika crop is followed by the second or vaisaku cultivation year after year. On sugar-cane lands, however, crops of rice and sugar-cane are raised in rotation or alternately every second year.

As regards the crops noted below‡ raised on the very best sort of regur land, the only approximation to a system of rotation is as follows:—

First year.—Cotton and korralu are sown together, one row of cotton to two or three of korralu, or sometimes the former alone, or white cholam, and sometimes mixed with Bengal gram in the proportion of five rows of the former to one of the latter.

Second year.—White cholam alone or mixed with Bengal gram.

Third year.—White cholam or wheat.

As a general rule, cotton is sown only once in three years on the same land, as it is alleged that this crop greatly exhausts the productive qualities of the soil and engenders much heat whereby the land is disqualified from producing in succession any good crop.

Similarly for crops grown on other lands.

Kurnool.—There is no regular rotation of crops practised anywhere in the district. Jonna, the great staple, is grown year after year on the same fields occasionally replaced by cotton and other grains according to the convenience of the farmer, though not with the idea of any benefit arising from such change of crop.

The extent of each particular crop grown in any season, leaving out of consideration any extraordinary inducement on account of increase in price, depends almost entirely on the date of the rainfall. If the monsoon breaks early, sadza, yellow jonna, korra, and araga will be largely cultivated. If the rains are late more horse gram, cotton, and white jonna, which are sown in August and September, will be put down, and if there is a general fall of rain late in October there will be an unusual growth of wheat and Bengal gram, with other insignificant grains that can be grown rapidly and reaped within three months.

With regard to fallow, the better soils of the district are cropped year after year in perpetuity; but this is of course impossible with the poorer soils, and the lower classes of the red ferruginous series do not bear crops for more than three years in succession. They are then thrown out of cultivation for three or four years, after which they are again brought under the plough.

Except in special localities land of this description is not worth retaining by the owner during the years of fallow. It is thrown up when exhausted and again taken up, often by the same party, when supposed to have become once more fit for cultivation.

With regard to the use of manure, the application is universal in the case of all irrigated lands.

Paddy lands are manured with animal refuse, but more generally with the branches and leaves of trees. Garden lands are invariably cultivated most highly, the sweepings of the villages and cattle manure being used. Flocks of sheep are also penned over the fields for the purpose of manuring them. The richer dry fields, when situated near the village, are treated in the same manner as the garden lands. It may be

* Fifteen to twenty-five bandy loads of manure for an acre.
† Jilladu or *Asclepias Gigantea*, or *Tangadu* or the *Cassia Auriculata*, *Kaniga* or *Galedupa Arborea*, wild indigo.
‡ Cotton, korralu, Bengal gram, white cholam, wheat.

said truly that no agriculturists in the world are more alive to the value of manure than those of India, and with regard to their high garden cultivation there is little which under their peculiar circumstances they have to learn from European science.

In the taluks of Cumbum and Markapur, which are situated to the east of Nallamalai Hills, and depend chiefly on the N.E. monsoon, the system is different. Here dry cultivation is of little importance and the ryots are chiefly engaged in wet and garden cultivation. The soils are poorer and jonna is little grown. The poorer soil in these taluks are never cultivated for more than three successive seasons, they are then abandoned, and possibly taken up again after a lapse of four years. But the supply of this kind of land is so limited that no ryot thinks of retaining fallow land in his puttah. In the dry cultivation of these taluks manure is never applied.

Wet and garden lands are however highly cultivated under the Cumbum tank which is well supplied by stream from the Nallamalai Hills; sugar-cane and double crops of paddy are grown every year. The natural poor soil of this valley has been enriched by high cultivation and its fertility is probably not to be surpassed in India; every field is heavily manured for every crop; that chiefly used being leaves and branches brought often from a distance of 20 miles.

The other scattered portions of irrigated land in these taluks are more generally enriched with cattle manure. Each ryot devotes his whole available supply to his plot of garden ground, and the large flocks of sheep and goats in that part of the country are always folded in their fields during the hot weather, and after each crop is cut—a practice to which the shepherds look as one of their most certain means of remuneration. They are generally paid for the use of their flocks by a portion of the produce.

South Arcot.—Land cultivated with varagu in dry is left fallow the following year; also wet lands cultivated with sugar-cane are similarly treated. As a rule the only fallows in dry grain lands are after varagu; the fields thus cultivated are allowed one year's rest, and as these lands are usually cultivated with varagu they are fallow every alternate year. With manuring and rotation of crops these lands might doubtless be made available year after year, but the system has never been introduced. After sugar-cane, wet lands are always allowed a year's fallow.

As regards Nunja land, twigs and leaves of trees and shrubs, refuse of indigo and ground-nut are used as manure; the stubble is also ploughed in. For dry lands cowdung and sheepdung, as well as the sweepings of the houses and backyards are employed; but the practice most usually adopted is penning sheep in various portions of the field to be manured. In the southern portions of the district the Coleroon brings down such a rich alluvial deposit that this fertilizing ingredient, termed "vandall," acts in lieu of manure, and makes the lands under Coleroon irrigation most rich and productive.

Tanjore.—The practice of cultivating crops by rotation is not known as regards wet cultivation in Tanjore, the same crop being always cultivated on the same lands. In the case of dry grains, ragi and varagu are the only crops which, as a general rule, are cultivated alternately with other crops, in consequence of their being considered to exhaust the fertility of the soil. Other dry grains are also changed from year to year; but this is more by choice than as a measure intended to prevent the fertility of the soil being impaired. The practice of leaving lands fallow is observed to a limited extent in the Kadarambham or dry tract of the Tanjore Taluk, but this is only in the case of lands cultivated with varagu. This, moreover, is not regulated by any fixed rule, the land being left fallow sometimes every second year and sometimes once in two or three years.

It is the inferior soils which require any considerable amount of manuring. Of the superior soils "iruman"

and "karisal" require it in a far less degree, and the red alluvial soil requires little or no manure.

The manure generally used is the excrement of cattle and sheep. For this purpose herds of cattle and flocks of sheep are sometimes made to stand on the fields during the night time before the ploughing season; but when this is not practicable the mode generally adopted is to preserve the dung in heaps along with ashes and the sweepings of houses, and to spread it over the soil. The sandy and brackish soils are manured also with the leaves of plants both dry and green, as well as with the silt in dried up tanks and low pits, which is scraped out and spread over the fields.

Madura.—As to manuring (dry land as well as wet or garden), oxen or sheep, or both in large numbers are hired (from people who purposely keep up such, and itinerate through the country in quest of pasturage and employment for their herds) and herded in the fields at night, and the dung and urine the cattle drop is excellent manure. Also, dung wherever found, is collected and taken to the field, as are ashes, rubbish, and chaff of paddy. In regard to Nunjah lands it is further usual to throw bundles of kolunjee, avarai, crukolai, &c., leaves in the fields, and plough them down in the mire to make them rot. For some years past the refuse materials used in tanning sheep skins, consisting of avarai bark, lime, &c., are also made use of as manure in the vicinity of towns. Rarely alluvial deposits in beds of the tanks, channels, and ponds are used for the purpose. Excrement of bats, which are found in old ruined or unfrequented places, is excellent manure, and is made use of in wet nurseries. To remove brackishness of soil, milkhedge, varagu straw, horses' or asses' dung are used. Sierumangan and some other kinds of paddy are sown in lands so treated, and are believed to neutralize brackishness.

Tinnevely.—In rice-growing lands nothing that can properly be called rotation is practised. The ryots are, however, in the habit of sowing an inferior kind of grain in April, while the best kind is grown in October. There are two kinds sown in April, one called annackumben, a small grain, and the other codaikulatham, a grain of a somewhat darker colour. As regards cotton, no rotation is practised. Betel crop will last for three years, after which time it becomes coarse and old, and the ground is incapable of producing another crop. Paddy is grown for four seasons, after which betel may be again planted.

Two plantain crops in succession cannot be planted on the same land. The next year after the plantains have been gathered some other Nunjah or Punjab crop will be sown, but it does not seem there is any rule as to what kind of crop.

If cumboo crop is grown on a rich soil, such as black cotton, no rotation is practised. If dry grain is grown on red soil is varied with some other dry crop, but not apparently with regard to any systematic rule. The same practice is followed with regard to cholam and varagu, but the practice appears to depend on the scarcity of some other dry grain crop and its consequently enhanced price rather than on any idea that the soil is benefited by a change of crops.

Land left fallow.—Wet land is never left fallow when there is a supply of water. With regard to dry land, it seems to depend on the quality of the soil, whether the land is left waste occasionally or not. Good rich soil is always cultivated, while poor soils are, as a rule, left uncultivated once every three years. This remark, however, does not apply to lands irrigated by artificial means, such as wells, &c.

Manure.—In the Tinnevely District, manure, when it can be procured in sufficient quantity, is used for all crops, and the people seem fully alive to the importance of this measure. The manure generally used is the dung of cattle, and the refuse of towns, villages, &c., mixed with ashes. A very common practice is to fold sheep in a field before it is sown, and plough in their dung afterwards. In rice cultiva-

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tion a somewhat curious method is followed. For the second crop, at the time of transplanting the young paddy, bundles made of the branches and leaves of a small shrub called "avarankulay" are thrown into the field and left to rot. This is supposed to impart a superior quality to the paddy. For betel cultivation no ashes are used, the dung of sheep is generally dug in.

Coimbatore and Nilgiris.—In the superior descriptions of dry land situated south of the Noyel River, cholam is generally sown as a first crop in April and is followed as a second crop, and in the interior lands horse gram is grown as a second crop. In dry lands situated in other parts of the district gingelly seed is sown in March and is followed by a second crop of horse gram or cumbu. In a great portion of the garden lands cholam is first sown, and is succeeded by a crop of ragi, chillies, wheat, or tobacco, according to the quality of the soil and the convenience of the ryot. In other localities the garden lands yield three crops in the following order—1, cholam, 2, ragi, 3, tobacco. In some of the two-crop paddy lands the first crop is followed by a crop of sugar-cane, which takes 12 months to come to maturity.

The inferior dry lands on being exhausted are allowed to lie fallow for periods ranging from three to five years. They are not, as a rule, manured, except on the Neilgherries and Colegal taluks. On the Neilgherries the manuring of the land is limited to those fields in the vicinity of the villages on which valuable crops, such as wheat and garlic, are grown. On the garden lands considerable care is bestowed in manuring them, manure is carted or otherwise carried from a distance, and cattle and sheep are folded on them. The shepherds fold their sheep on a ryot's land at so much

per head per month. The wet lands are improved by the supply of vegetable manure, in the shape of bushes, which are cut down, spread over the land, and immersed in water until they decompose. The bushes chiefly used are the "Tephrosia* purpurea" and "Calotropis† gigantea;" women collect the bushes and sell them at so much per head-load; like everything else, the price of these bushes has increased of late.

12. South Canara.—Manuring.—The importance of manuring the land is well known in Canara, and manuring is universally practised. For every cubit of land, it is stated that a basket of cowdung is necessary, and to this is added dry and green leaves, ashes, &c. In fact, manure is considered of so much importance in the labours of the field that the well-being of the cattle is often sacrificed to the obtaining the largest quantity possible.

Rotation of Crops.—The rotation of crops, as a rule, may be said to be unknown. Sugar-cane, which is an exhausting crop, is not, however, grown for many years in the same place; where water for the second or third crop is not available, dry grains are planted. In some lands in the neighbourhood of the ghauts, the second crop of rice is raised only every second year; in the intervening years oil seeds are raised.

Fallows.—Fallows also may be said to be unknown, and, as a rule, where land can be cultivated, it is never allowed to lie waste. In the kumeri cultivation on the face of the ghauts a crop is only sown once in a series of several years, and is not cultivated a second time till the jungle is again grown, and admits of being burnt.

* Colinjee.

† Yereockam.

MYSORE.

MYSORE.

Mr. Ricketts.

The soil of the district is on the whole of an inferior description, and requires constant manuring. The lands about Bangalore are highly manured. There is less rotation of crops than I believe in many other parts of India. Fields have been pointed out to me where the same crop, ragi, which is the staple food of the country, has been grown for years running. This can only be done by good manuring, and when manure fails then a rotation crop is put in. In the present year in particular a larger area than is usual has been sown with ground-nut (*Arachis Hypogaea*) because the land was not sufficiently manured, and next year too the same land will get on well without manure, even though sown with raggy, because the leaves of the ground-nut form a good manure in addition to the benefit of pulverization of the soil by the thorough digging up of the soil in order to get the nuts. On the whole, when much manure is available ragi will be sown on the same field for a number of successive years, and when manure is wanting, or the ragi crop fails from capricious rain, then an inferior crop, chiefly horse-gram, is put in. In poor soils the staple crop is usually horse-gram. I may state here as a curious fact that the ryots of this district neglect manuring their wet in favour of their dry lands, and I am inclined to believe that this preference had its origin in the objectionable system of batai or half-share by Government in the produce, whereby, if the ryot manured the wet land half of the benefit thereby went to the Government.

Mr. Harman.

The proportion of land manured depends on the supply of manure, and may roughly be stated at $\frac{1}{4}$ of the cultivated land of dry land and $\frac{1}{2}$ of the wet.

Ragi is the crop manured on the dry land, and the supply of manure settles the area under this crop. Manure is seldom given to other crops than ragi, except where cholam is largely grown, when that crop

receives some of the manure, pulse and oil crops do not receive manure.

On wet land in places manure is given to the crop of paddy by previously growing leguminous crops and ploughing them in, also by collecting leaves and weeds and trampling them into the mud; and thirdly, by the use of the house refuse, chiefly composed of the ashes of cowdung.

The average weight of manure to the acre is:—For dry land from 2 to 5 tons, consisting of $\frac{2}{3}$ rd ashes $\frac{1}{3}$ litter near large towns; near the villages entirely dried dung; for wet land no figures can be given.

In the best instances in the Talkad, Malvalli, Mundium, and Yedatore taluqs.

A crop of hesseru, udu, alusandu, and hurale mixed, is partly grazed, and then ploughed in, or more rarely, hemp grown from 1 to 3 feet high is ploughed in.

The ashes from the village and the green leaves and stems of *calotropis gigantea*, a species of *convolutus* (*sic*), wild castor-oil and other shrubs; also the leaves of the hongay and banyan where procurable, are pushed into the mud.

In the worst instances no manure is given, and every intermediate stage is to be met with. Generally where the land is held by Brahmans and let on wara ($\frac{1}{2}$ share) less attention is paid to manuring, and the cultivation is in all respects inferior.

Bangalore District.—The proportion of land manured is about $\frac{1}{4}$ th, except round the neighbourhood of Bangalore, where almost the whole of the land is manured yearly within a radius of 8 miles.

The average weight of manure given to the acre is:—To dry land—Round Bangalore about 6 to 8 tons town refuse, less in the district. To wet land—Very little. Green manuring is also in small quantity, as the supply is insufficient.

In the neighbourhood of large towns the land is constantly manured. In the immediate neighbourhood

of villages the land is frequently manured. Distant fields are not manured.

Is there any customary rotation of crops or fallows? state it.

Dry land—Mysore district.

1st year cholam followed by a gin- Unmanured.
gelly or a pulse crop.

2nd year ragi - - - Manured.
or

Harica, if manure insufficient.

This is frequent, but hardly customary, as the crop sown depends first on rainfall, at particular season, second, the supply of manure which regulates the area under ragi.

Wet land, under channel cultivation.

Pulse crops, viz., udu, hesseru, alusandu, hurala grown in hot weather, partly to give a little food to people and stock, partly to plough in as manure, followed by paddy transplanting from seed beds in July and August and manured.

This cultivation when properly conducted leaves little to be desired, except deeper cultivation; but it is a question whether grain other than paddy could not be grown requiring less water, and so permitting an extension of area of irrigated land by the rich river water.

Wet land under tank cultivation.

CENTRAL INDIA.

CENTRAL INDIA.

Mr. Wingate.

To these lands manure is conveyed neither by bullock nor cart, but in baskets each containing 10 seers of manure, and it is said that about 200 baskets will suffice for an acre, and the weight will thus be $200 \times 10 = 2,000$ seers = 50 maunds.*

WESTERN MALWA.

Crop manured.	Manure per acre.	Rotation.
Indian corn	Annually sown in manured land, which is irrigated in abi season.	Jowar and cotton alternate.

RUTLAM.

Crops manured.	Manure per acre.	Rotation.
Opium - -	220 maunds per acre.	Gram (on virgin soil) followed by wheat; then jowar, and a fallow (when land is exhausted).

DEPUTY BIREEL AGENCY MAMPUR.

Irrigated land is manured constantly, 200 maunds per acre.

Crops manured.	Manure per acre.	Rotation.
Indian-corn } Jowar - - }	Are manured occasionally 40-60 maunds per acre.	Wheat and grain rotate with jowar and tur. Poppy follows Mukka.

HYDERABAD.

HYDERABAD.

Moulvie
Mahdi Ali.

The garden,* tabi rice, and sugar-cane lands are always manured. Out of the manure collected, or procured by the cultivators, the necessary quantity, which is very large, goes to manure the above lands. If there still be more manure left, it is given to the

* Garden crops include opium, maize, potato, yams, chillies, onions, garlic, &c. Tabi rice is the late rice sown in the winter.

other crops in a fixed order, in which the tabi rice stands first.

Castor-oil seed, mung, and cotton are not manured at all, for they are considered by the cultivators as reclaiming crops, their leaves, roots, &c. being supposed to do much towards fertilizing waste and outlying land.

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If manured, wheat and barley crops would certainly produce a more splendid and plentiful harvest; but very little or nothing can be spared for them because of the wholesale appropriation of manure by the garden, tabi, and sugar-cane crops. In some talukas, however, the grain crops are moderately manured once in three or four years.

As to the proportion of the whole cultivated land which is manured, it is said that in the different districts it varies from 8 to 20 per cent. The whole manured land in Telengana I believe amounts to 16 per cent.

An approximate estimate may be formed as to how many acres of land it is possible to manure from the dung of cattle and goats collected during the rain, and how many by herding cattle or goats on land during the other seasons. The question is,—

1st. The number of cattle, goats, and sheep in the villages of the province.

2nd. The quantity of dung which can be collected in the rainy season.

The district officers give us no help in respect of the first of these queries, but from my personal inquiries made in the taluka of Utraf Balda, I can give the following data:—The dung of four cattle, viz., a cow, a bullock, and two buffaloes, collected throughout the four months, together with the ashes, sweepings, leaves, &c. which are mixed up with the dung in the pits kept for the purpose, will make about 180 maunds (about 6 tons) of manure. Under the second head all the district officers (except those of Yelgunda) have submitted detailed statements. The statements sent in by the talukdars of the districts in the Eastern Division appear to be correct, and from them the following results have been obtained. The number of cattle in the Eastern Division of the Telengana country amounts to about 1,009,835. Calculating according to the above estimate, i.e., four cattle produce 180 maunds in four months, the amount of manure collected from all the cattle of the division would be nearly 45,442,575 maunds.

Now taking 400 maunds to be the average amount of manure given to a bigha, the number of bighas manured from the above quantity would be about 113,600, which would be about $\frac{1}{10}$ th of the total cultivated area of the division in 1284 Fusi.

But there cannot well be quite so large an amount of the manure, and what is used is not utilised over so large a surface as the proportion just named. Two considerations go to support this view, (1) in the total number of cattle given those belonging to the non-cultivators have been included, but the dung of these is, for the most part, not available to the cultivators; and (2), the quantity of manure bestowed on the sugar-cane and garden crops is in some talukas much greater than the average of 400 maunds per bigha deduced. The number of goats and sheep in the division amounts to 1,715,591. About 2,000 goats or sheep on the average are supposed to be quite sufficient to manure one bigha in one day. Calculating from these data, it will appear that during the three months Chet, Baisak, and Jeth, so many as 77,220 bighas can be manured by folding sheep, &c. on land, i.e., about $\frac{1}{20}$ th of the total cultivated area of the division.

In our Mahratta country manuring is not at all affected by the consideration of the kind of soil, but by the nature of the crop to be raised. The sugar-cane, garden, paddy, and poppy lands being all irrigated are therefore necessarily always manured. To portions of rabi crops also manure is sometimes given. Kharif receives nothing at all. Tabi rice crop is here unknown.

The kind, quantity, and quality of manure are very similar in these districts to those in Telengana. There is a difference in one respect, namely, that the manure given to sugar-cane land in Maratwari is only half or one-third of that given in Telengana.

Only about from three to seven per cent. of the cultivated area is yearly manured. The low percentage of manured area in Maratwari may be accounted for by two considerations.

1st, there being here no other sources of irrigation excepting wells, the country depends chiefly on rain-water, and the irrigated area does not consequently amount to more than three per cent. of the cultivated area. It is believed by the cultivators that lands which cannot be irrigated from artificial sources, and depend upon rain-water only, are much injured by being manured when the monsoon fails, and that being left dry, manure would do injury by more rapidly withering up the plants. 2nd, there being very little or no jungle in this portion of the country, fuel has to be obtained from cattle dung made up into cakes, which are bought and sold for fuel. The cultivators consider that by subjecting cattle dung to this process they realize much more than they could from any addition to the value of the crop that would be derived from the use of the cattle dung as manure. Here it will be better to give in full that portion of Dr. Bradley's report on Dowlatabad Sircar which treats of manure. It is as follows:—

"The natural fertility of the soil of India has occasioned a neglect of the important subject of manures; in these districts its chemical constitution exhibits a rich amount of inorganic salts, the various quantities of which are essentially requisite in obedience of a fixed law of vegetable organism for the perfect development of the several parts of the plant. It is in trap soils that we may look for a bountiful supply of aliment for the vegetable world, the amount varying with local circumstances, but even when so small as to afford but a single grain in each pound of soil a foot deep, it still is equal to 500 lbs. in an acre. Flooding the country during the rains spreads far and wide the soluble salts of the wasting rocks, hence the remarkable fertility of certain trap soils, which are said to possess the power of raising wheat, the most exhausting crop that grows, for 30 years without a fallow, recruiting its lost energies by the restoration of these salts during the rains, and in some countries, I believe in the Azores, the most luxuriant crops are raised with no other manure than that afforded by pounded trap rocks strewn over the land. These rocks, if examined into, will be found to produce abundant materials for a soil when reduced by the action of the air; for instance, in felspar we shall obtain potash, alumina, silica, and lime. In horn-blend, magnesia and iron; the zeolitic minerals are composed of silica, alumina, lime, soda and iron, and in chalcedony silica and alumina, whilst in quartz we find silica in a pure state, and in jasper mixed with iron. Here there are materials for a soil highly favourable to vegetable life, which are brought into active operation by the rains, and, unlike the evanescent character of soils enriched solely by vegetable matter, are permanent in effect. The usual practice is not to manure any crops but sugar-cane, poppy and pân, the source from whence this is derived is the village mixed and, occasionally, folding cattle; a very valuable manure for cane lands lies totally neglected in the heaps of cane ashes beside the sugar mills, and are not deemed sufficiently worth returning again upon the land, which were it done, abounding as they do in silicates, could not but prove highly useful to the plants, which it is well known particularly need these supplies. Green manures are occasionally applied to worn out soils. The green stalks and leaves of the tobacco plant are always ploughed into the land, after the crop is pulled; nothing can be more injurious and unfair towards the soil than the pernicious custom of converting the excrement of the cow into fuel."

A regular rotation of crops is followed in the Telengana districts in the inferior descriptions of soil (termed chilka soil). When waste land is prepared for cultivation, crops producing oil seeds are generally grown for the first year; the next year the land is put under yellow joar, and this is followed by sanva and kudru. If the land lies near a village, facilities for manuring the soil are afforded, and therefore a mandwa crop is generally raised. In the better descriptions of land, if the soil has been exhausted by joar crops gingly

seed and úrd are raised on it, and sometimes hemp. A mixed crop of kudru and túr is also raised. A joar crop is also sometimes followed by a cotton crop. By constantly cropping the soil with yellow joar it gets exhausted, and therefore joar is seldom or never grown for two successive seasons in the same field. In the better descriptions of waste lands (regar and milwan), in which rabi crops are grown, kulthi, lakh, or castor-oil seeds are first sown; this is followed in the next season by kulthi, gram, masur or peas, &c. In the third year joar mixed with linseed or kurdi is sown. After that, a rotation of joar and kulthi crops follows. In irrigated lands, in which paddy is grown, no regular rotation of crops is followed, but sometimes sugar-cane and betel are raised. The irrigated lands of the Telengana country generally yield two crops in the year, and if the soil gets exhausted, and the cultivator thinks a fallow necessary, he raises only one crop that year.

In the Mahratta country, too, a rotation of crops is observed. If waste land is prepared for kharif cultivation, bajra or cotton is first sown. For two or three successive years nothing but bajra is raised. This is followed by moong, úrd, mott, hulga or hemp, and when the land reaches that condition when ploughing becomes necessary, a tur crop is last raised. The roots of this crop strike deep in the ground, and as this loosens the soil ploughing is easily carried on. When waste land is prepared for rabi cultivation, joar or kurdi is first sown, this is followed by wheat or joar for four or five successive years, after which gram is raised for the season. When the ground requires ploughing, any one of the kharif crops is sown, and then next year the ground is ploughed. In wet cultivation, if sugar-cane is raised one year it is followed by paddy next year. No regular rotation of crops is otherwise observed in wet cultivation in the Mahratta country.

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HYDERABAD.

Moulvie
Mahdi Ali.

CHAPTER I.—QUESTION 7.

Have any attempts been made by the Government or private persons to improve agriculture in your province, either in the way of introducing new or improved implements, or new staples, or improved seed, or better methods of cultivation, or better breeds of cattle, and so forth, and with what result? Have you any suggestion to make for such improvement? Is there any Government model farm in your province? Or have any estates under the management of Government or of the Court of Wards been used for the object of making experiments or setting examples of improved agriculture? If so, state the system of management, whom they were placed under, and what the results, financial and agricultural, have been? Have any improvements been made in the breed of cattle, in the forms of ploughs, carts, sugar mills, or any other agricultural instruments, or in the mode of drawing water from wells? Have any agricultural exhibitions been held in your province, and have you observed that any good result has been obtained from them? Was anything exhibited the imitation or adoption of which would have been useful to and practicable by the ordinary cultivator? And, if so, was there any willingness to imitate or adopt such improvements? Have you observed that there has been any deterioration of the soil, or that crops are worse than they used to be within your own experience? Does any such question specially arise in case of irrigated land? State specifically on what facts you base your replies? Where there is any popular belief in such deterioration, state what facts are adduced in support of it?

PUNJAB.

PUNJAB.

Major Wace.

The Introduction of New Staples.—Immediately after the annexation of the Punjab, in 1849, the attention of district officers was directed to this subject. Small quantities of various seeds were distributed to them on some occasions by Government, and on others by the Agri-Horticultural Society of Lahore.

It was hoped that such new crops, if successfully grown in small quantities at the head-quarters of each district, would spread from these centres. In the majority of instances this expectation has been disappointed. I notice the principal staples so experimented with, and the result to date in each case.

Sorgho Sucré or Imphi.—Experimental sowings of small quantities of this crop have been continued at the head-quarters of a number of districts with more or less persistency for now 20 years past. It is an autumn crop with conditions of growth similar to those of joar (*Sorghum vulgare*). At the same time it grows more luxuriantly, and contains much more saccharine matter. For both reasons it would presumably be a valuable addition to the autumn fodder crops. In several districts, especially Rawalpindi, Siáikot, and Kangra, the agriculturists were induced to sow it experimentally, but they gave it up after trial. It is now seldom or never seen outside the gardens of the district and municipal committees. I do not find anywhere an exact account of the reasons for the agriculturists' disinclination to cultivate the crop.

Oats have been continuously sown at the head-quarters and tahsils of several districts for 25 years past, with very fair success. They thrive well on such

land as is ordinarily sown with wheat and barley. But except at the Government studs, and to a very limited degree in our military cantonments, there is no market for the produce. The people will not eat the grain, and in their judgment the straw is not much better fodder for their oxen and milch cattle than that of wheat and barley. The crop consequently does not establish itself.

New varieties of Maize.—A little has been done lately, as in the case of *sorgho sucré* above, with a view of introducing new varieties of maize, but as yet with no outcome worth notice.

Carolina Rice.—From 1870 attempts have been made in selected districts to introduce Carolina rice. In one or two places (as for instance in Chamba), the crop grew well, but the rice produced was not liked, and the husking machine in common use broke the grain. The experiment consequently fell through.

Flax.—In 1854, experiments, the success of which at first appeared not improbable, were commenced with a view to extending and improving the cultivation of flax in the Lahore and Amritsar divisions. The district officers under Government instructions urged the agriculturists to extend their flax cultivation; Government offering rewards and undertaking to purchase the produce, which was actually done to the value of Rs. 50,000, the produce being resold without loss at Kurrachi. The crops grown produced abundant linseed, but little or no marketable fibre. The conclusion being arrived at that the production of fibre needed more skill than the agriculturists could give to it, the Government ceased to urge the cultivation of

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the crop. But subsequently, from 1860 to 1865, some merchants of Belfast kept an agent at Siālkot, who imported seed, advanced it to cultivators, looked after their crops, and tried to teach them proper methods of steeping the stalks with a view to the production of good fibre. These efforts resulted in the production of a limited amount of good fibre. But they also ultimately demonstrated to the agriculturists that the crop was not, at its best, much more remunerative than wheat. And at the death of the agent in 1865-66, the Belfast merchants, seeing that its cultivation was not likely to grow to any very large proportions, withdrew from their venture. About 22,000 acres of flax are cultivated in the Punjab. The local product is much poorer in fibre, but richer in oil, than the flax of Europe.

Cotton.—The attempts to improve and develop the cultivation of cotton in the province have been most numerous and persistent. From the earliest years of the administration, foreign seed was imported and distributed to district officers. The native cotton is of shorter and coarser fibre than Egyptian and American cotton; and the object aimed at in the distribution of foreign seed has been mainly the local production of a cotton of larger yield and longer fibre. The annual reports from the earliest period contain notices of the efforts thus made to develop the growth of foreign descriptions of cotton.

When the war in the United States cut off the supply of cotton from America,* on which the English manufacturers had till then relied, and the price of cotton was consequently greatly enhanced in India, every effort was made by district officers, under instructions from Government, to encourage the agriculturists to pay more attention to the cultivation of cotton, and the previous efforts to introduce good foreign descriptions were redoubled.† Various gentlemen (officials and others) proved by experimental cultivation that foreign cotton could be successfully grown; and in 1870 a canal engineer (Mr. Login) demonstrated that by adopting the Egyptian system of sowing on raised furrows 8 inches high and 3 feet apart, in irrigated fields, an unprecedented yield could be obtained even with the native variety of cotton.‡ But the ultimate outcome of all our efforts as yet is that the agriculturists adhere both to the native cotton plant and to their own methods of cultivating it.

The area of cotton cultivation in the Punjab has been carefully observed for 12 years past. It does not usually exceed 700,000 acres; about $\frac{1}{2}$ of the crop is irrigated, and the rest is dependent on rain only. The average yield of cleaned cotton per acre is believed to be something less than 80 lbs. The produce may be taken at 400,000 cwt. in an average year, of which usually one-third is exported, partly by boats down the Indus, and partly by rail eastwards. There is a small export of Indian cotton cloth westward into Afghanistan, from 50,000 to 60,000 cwt. The average wholesale price of cleaned cotton in 1876-77 was Rs. 20 per cwt.

Potatoes.—This crop was unknown in the Punjab before annexation. Its introduction in the vicinity of all our hill stations followed immediately on annexation. It is principally grown in the hill tracts of the Rawalpindi, Hazāra, and Kangra districts, and in the Hill States round Simla, and to a very small extent near our larger plain stations. The extensive consumption of this vegetable in our military and civil stations has been the stimulus under which its cultivation has established itself. But to a very limited extent it is gradually becoming an article of native

diet. The estimated area cultivated with this crop and its yield is said to be as follows:—

District.	Acres.	Yield per Acre. Maunds of 40 Sers each.
Near Simla	Not known	25
Kāngra	448	11½
Near Dalhousie	125	60
Rawalpindi	458	50
Hazāra	600	50

Other European vegetables have been sedulously cultivated by the local committees at the head-quarters of each district, but except in a small degree near our larger towns they are little cultivated outside the gardens of the local committees and English officers.

Tea.—This has been the most successful of all our attempts to introduce new staples.* In the year 1848 two small tea plantations were established in the Kāngra Hills by Dr. Jamieson, the superintendent of the Botanical Gardens of Sahāranpore. The experiment proving a promising one, the Government of India in 1852 directed its extension, and in consequence the Holta Plain (then waste) was taken up for the purpose.

By the year 1859 the success of the cultivation was so well established that Government deputed an officer to assist capitalists desirous of forming tea estates in buying suitable land from the native landowners.† This same officer, Major E. Paske, returning to the district in 1867, found a thriving tea plantation on almost every piece of waste land secured in 1859 for the purpose. The Lieutenant-Governor (Sir R. Montgomery), in a memorandum dated 13th December 1864, recorded that when he previously visited the Kāngra District in 1860 there was hardly an acre of tea cultivation outside the Government plantations, but that between then and his second visit in 1864, 17 estates, with an area of 15 square miles, had been created by European capitalists, and that the natives themselves were growing tea in 47 villages.

Major Paske, writing again at the end of 1872, reported the existence of 13 estates owned by Europeans and 15 owned by natives, the largest being 1,190 acres, with 190 acres under tea plants, and the smallest 13 acres, with 11 under plants. Some of the estates of intermediate size had from 400 to 500 acres under plants. In addition there were small plots of tea cultivation aggregating 681 acres. The entire acreage devoted to tea cultivation in 1872 was 7,732 acres, of which 3,292 were under plant; ($\frac{1}{3}$ mature, $\frac{2}{3}$ immature). The total annual yield had risen from 2,41,332 lbs. in 1868 to 4,28,665 lbs. in 1872. A return furnished to the Government of India in October 1877 shows that the area *under plant* had then increased to 4,611 acres (besides 1,773 acres under preparation for planting) and the annual yield to 7,23,088 lbs. The following statement supplied to me by the Deputy Commissioner of Kāngra shows the extent to which Europeans and natives respectively share in this industry:—

Years.	Plantations.		Area under Tea Cul- tivation.	Approximate Annual Yield.	
	Number.	Owned by		Lbs.	Value Rs.
1878 -	35	Europeans	4,787	5,60,433	4,16,669
	1,099	Natives	3,146	2,26,611	1,13,305
Total	1,134	—	7,933*	7,87,094	5,29,974

* This probably includes land taken up for planting and not yet planted out.

* Punjab Record, 1851-53, page 194.
† Major Paske's report on.

The Government withdrew from its experimental cultivation, selling its Holta estate to a European capitalist in 1865. The cost of cultivation (picking included) averages Rs. 60 per acre, and the yield of mature, i.e., over three years old plants, 200 lbs. The cost of manufacture subsequent to picking is six annas per lb. The best fields yield from 300 to 400 lbs. per acre. The tea is largely exported to the London market. The cultivation is increasing both by Europeans and natives, and great advance has been made in ascertaining the conditions best suited to its culture. Situated as the industry is in a populous agricultural district, there is abundance of labour available. And the relations between the European planters and the local native population have hitherto been of the best.

Tea cultivation has also been commenced in the Simla District, 120 acres being under plant. It was tried in the Hazāra and Rawalpindi hills, but has hitherto failed there.

It may be remarked in conclusion that this industry, though originally started by the Government, is entirely dependent for its development and promineney on the European enterprise engaged in it. If that enterprise were withdrawn the native cultivators would probably fail both in the preparation of the tea and in its exploitation in the European markets.

Cinchona.—A very earnest attempt was commenced in 1864 by Major Nassau Lees,* one of the gentlemen interested in tea cultivation in Kāngra, to introduce the cultivation of cinchona; and one of the Kāngra planters is still giving his attention to it, but hitherto the cultivation has not succeeded; the apparent cause of failure being that the climate is too dry, and in the winter too cold.

China Grass.—Attempts to cultivate China grass have hitherto led to no results, for a different reason, viz., the difficulty of inventing suitable machinery for cleaning the fibre. The Government of India have twice offered a large prize for the invention of such machinery, but this will no doubt be noticed in the replies submitted by the North-West Provinces in connection with the Sahāranpore gardens.

Silk.—Small experiments, having for their object the introduction of sericulture in the Punjab, have been tried at different times during the past 30 years in nearly all the submontane districts of the province, the experimentors being in nearly every instance the civil and medical officers of the province. For a summary of these experiments I would refer to Mr. Baden Powell's Punjab Products, pp. 161 to 177. I should serve no practical purpose by recounting them here, for they have all the same history. The result in nearly every case showed that silk cocoons could be easily raised at a great profit; but beyond this stage the experiments never proceeded, except in one instance. The subject was taken up four or five years ago in the Gurdāspur District by Mr. F. Halsey, an independent gentleman, who had settled in the north of that district. Following up successful efforts to introduce the growing of silk cocoons made by the civil officers of the district, he established a small silk filature, and was working it very successfully up to his death, a few weeks ago. For three years past the district committee at Gurdāspur, with Mr. Halsey's assistance, has held exhibitions of silk cocoons. For the best cocoons exhibited prizes are given annually by the committee, aggregating Rs. 1,000 in value, to which Mr. Halsey usually added. This gentleman had also offered three prizes, aggregating Rs. 1,000, for the best plantations of Chinese and Philippine Island mulberries in the Gurdāspur District, and the same sum for the Kāngra District; and he purchased for his filature the cocoons of all those who did not wish to reel their own silk. The Deputy Commissioner of Gurdāspur reports that the cultivation of the cocoons is now a well-established source

* Punjab Revenue Report, 1871-72. Manual of Cinchona Cultivation, 1876.

of profit among the agriculturists. It was at first confined to Kashmiris, but has lately been taken up by many among the agriculturists. The death of Mr. Halsey is no doubt a severe blow to it, but there are grounds for hoping that some one may be found to take over and maintain the filature, and thus keep up the newly-awakened interest of the agriculturists in sericulture.

Silk goods are manufactured in all parts of the Punjab, and especially at Amritsar and Mooltan. The raw silk thus consumed is imported principally from Afghanistan, Bokhāra, and Kashmir, and the gross imports were estimated 15 years ago to be worth Rs. 20,00,000 per annum. Of this a portion passes on to other provinces. But it is evident that sericulture and silk filatures might be developed into most profitable industries. I annex a few remarks on the subject furnished by Colonel F. Millar, the deputy commissioner:—

"I believe the cultivation of cocoons is now independent of prizes; it has established itself, and would not, I think, suffer if the prizes were withdrawn, although I think prizes should continue for some time to come.

"At first Kashmiris took up the cultivation of cocoons, but now agriculturists and their families have done so, as well as Brahmans, Sayads, Fakirs, and other classes; outsiders are not apparently attracted by the prizes; none have as yet competed; all having been taken by persons residing in the district, and this year the first prize was awarded to a Lambardār of Gurdāspur.

"I am of opinion that this industry has now become thoroughly established, and is likely to flourish, although it has sustained a blow by the death of Mr. Halsey, who took much interest in it, distributing young plants of the exotic mulberry gratis to all wishing to plant them. He also purchased the cocoons of all parties who did not wish to reel their own silk.

"One Zamindār of this district purchased eggs for 1 rupee, and made a clear profit of Rs. 22, after paying all expenses, and this has induced many others of the same class to commence operations.

"The men work in the fields, while the women employ themselves in taking care of the silkworms."

Agricultural Implements.—Our attempts to improve the aids to agriculture (leaving the improvement of cattle to subsequent notice) have been confined to artificial manures, improved sugar mills, and ploughs.

In 1874 patent iron sugar-cane mills (Thomson and Mynne's) were supplied experimentally to several districts. But trials showed that they were not fitted for the small cane of the Punjab, and failed to crush it sufficiently.

More recently in the present year a suggestion was made for the importation of light ploughs manufactured by Messrs. Ransomes, of Ipswich. It was shown by the late Mr. Halsey of the Gurdāspur District that the ploughs were sufficiently light for the cattle of the country, and that they could be delivered at Lahore at a cost of Rs. 24 each. But the suggestion was abandoned, because the shares could not have been renewed by native workmen; in fact supplies of them could only have been obtained from England, or from Government workshops. But the late Mr. Halsey cultivated 250 acres of land at Sujāpur in the Gurdāspur District with English ploughs drawn by cattle, which, though no doubt superior to the ordinary plough cattle of the country, were yet bred by their owner from selected country stock, and he obtained crops from the land far superior to any ordinarily raised in the neighbourhood.

For a not dissimilar reason attempts made shortly after annexation to improve the Persian wheel used all over the Punjab for raising well water for irrigation have failed of accomplishing any practical results. It is easy to indicate how the well gear could be improved, and made to do a larger duty with the same draught power now employed, but all the improvements yet suggested require more skill for their con-

* See Annual Revenue Reports from 1860-61 to 1864-65.
† Selection from Financial Commissioner's Records, No. 11.
‡ The late Mr. Login's experiments were made at his own expense on very small areas. They were subsequently successfully continued at Government expense for two or three years on 50 acres of land at Chandī, near Umballa. Among the papers appended will be found a report in which he gave an account of the principles on which his experiments were based and of the manner in which he applied them.

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struction and maintenance than the rural artizans possess. Well gear which cannot be made and repaired by the ordinary village artizan is useless to the ordinary agriculturist.

Sugar factory at Sujampur.—The enterprise of the late Mr. Halsay also succeeded in starting at Sujampur sugar mills for manufacturing sugar. The capital (Rs. 4,00,000) was subscribed principally by 88 European gentlemen, many of them officers in the Punjab, and about Rs. 32,000 by native merchants. The mills are only in their first year; but there is little doubt that they will yield large profits. They are worked by water power, supplied from the Bári Doab Canal, and the machinery was imported from England. The objects aimed at by the company are the manufacture of sugar suitable for native consumption and the manufacture of rum.

If the profitable character of these mills is established, there is reason to believe that they will be extended, so that other similar companies will be started.

Cotton and woollen mills have not yet been started in the Punjab. But if European enterprise and capital is once attracted to the richer districts of the Punjab, there is little doubt that in sugar, cotton, wool, silk, and other products, it will find abundant field for profitable employment. The bearing of such enterprises on the prosperity of the agriculturists who supply the mills with raw products is patent. And it is in the development of such enterprise, whenever practicable, rather than in legislative schemes and systems of local Government, that the true remedy is to be found for the indebtedness, the poverty, and the unskilfulness of the native agriculturist.*

Model Farms.—There is no model farm in the Punjab, the only attempt yet made to establish one came to an end at the close of 1876. Its history was as follows:—

In 1873 the Government of India offered to assign to the Punjab the services of a trained gardener, and Rs. 4,000 towards the expenses of an experimental farm. The offer being accepted, the gardener, Mr. Lloyd, was first employed on a small area of land near Umballa, on which experimental cotton cultivation had been attempted; but in 1874 he was placed in charge of 176 acres of Government land near Amritsar. The land was of varying quality, some decidedly bad, but it was conveniently situated near a large town.

After three years' trial it appeared that the farm had been steadily cultivated at a loss (not reckoning the superintendent's salary), and it was therefore broken up at the commencement of 1877.

If the farm had really served the purposes of a model farm, an effort to keep it up in spite of the expense would probably have been made. But it was on too small a scale to furnish any useful results; and it was not in the hands of a man who by his antecedents could have any real knowledge of the agriculture of the country. The proper scope and aim of a model farm was thus described by Mr. Egerton, when Financial Commissioner, at para. 33 of the Revenue Report for 1873-74:—

"The progress of the experiment of a model farm depends much upon the plan of operations adopted. It is to no purpose that superior staples are grown before the eyes of the people, if the mode of cultivation is totally foreign to them. The only means by which any real aid towards the development of the

resources of the country can be afforded is by a study of the system of tillage which is in ordinary use, and by applying to it such improvements as the people are competent to appreciate. Any movement towards improvement in agricultural produce must therefore initiate with a full appreciation of the mode of agriculture to which the people are addicted, and in which they have confidence; and only those innovations will be accepted by them which tend gradually to ameliorate this method, and not those which involve a total abandonment of their time honoured habits."

On the same subject I append a memorandum dated 10th January 1872, written by the late Mr. F. Halsay.

Farm in the Dera Ghāzi Khan District.—The Deputy Commissioner of Dera Ghāzi Khan has a farm of 19,000 acres (1,100 cultivated on the local system by tenants) in his district, and another considerable area in the Biloch Hills, near Fort Monro. The objects of the farm are to induce hill Bilochis (hitherto strangers to agriculture) to settle there and learn agriculture, to introduce certain improvements in the breeding of Biloch horses, to improve the cattle and sheep of the district, and to distribute fruit and shade trees. The farm pays its own expenses.

Estates under the Court of Wards.—In the Punjab it has not as yet been found practicable to use any estates under the Court of Wards for the object of making experiments or setting examples of improved agriculture.

Improvement of Sheep.—Rams have been imported from England in small numbers, and sent to the Hazāra and Shahpur districts. Up to a late date the report of the results was not encouraging. It was stated that the fine fleeces were much torn and spoiled by the thorny bushes common on the lower grazing grounds; but the last report from Hazāra states that the breed is liked for its size. A number of other superior rams have been for some years past distributed to the districts where there are most sheep, but it is only quite lately that any exact accounts have been taken of the result. In 1877 it was ascertained that of 100 rams distributed 50 had died. As regards the progeny, the reports do not show any material progress as yet in the improvement of the breed. On the other hand, the leading agriculturists in each district are by no means indifferent to the matter: and they willingly accept the charge of the rams, and comply with instructions concerning their keep and use. Sixty-four rams are now made available each year at the Hissār Cattle Farm for distribution to Punjab districts free of charge.

Improvement of Cattle.—Similar means have been adopted for the improvement of the horned cattle. Bulls have been distributed from the Hissār Cattle Farm to as many districts as applied for them. The first distribution of 30 bulls took place immediately after the annexation of the Punjab. But the subject was lost sight of for some years, and it was only in 1876 that attempts to ascertain and watch the results were revived. The reports received were of varying character; but on the whole they showed, that in those cases in which the selections were judicious, the bulls were appreciated by the breeders, and rendered valuable service in improving the breed of draught cattle. Thirty-two bulls are now made available each year at the Hissār Cattle Farm* for supply to Punjab districts free of charge. The keep of the bulls costs the agriculturists little or nothing. It is usual to make over a bull to some large central village, and he is allowed to roam free with the village cattle. The aggregate progeny of the bulls is as yet insignificant in numbers.

Cattle Fairs.—On this subject I subjoin an extract from the Revenue Report for 1876-77. The return quoted herein is also appended. Since this extract

* This is an institution kept up by the Military Commissariat Department. It consists of 43,000 acres of waste land near Hissar, and it is devoted principally to the production of horned cattle. The stock on the farm numbered 10,521 on the 31st May 1877. It is in charge of Lieut.-Colonel Robinson.

was written prizes for cattle have been offered at the Rawalpindi Horse Fair, and a large cattle fair is likely to be developed at that place:—

"The most important fairs are those held in the districts of Hissār, Rohtak, Sirsa, and Amritsar. Of the total of 183,027 cattle attending all the fairs in the province, all but 10,000 were at the fairs in these four districts. The minor fairs were held in the districts of Jullundur, Hoshiārpur, Gurdāspur, Siālkot, Gujranwāla, Ferozepore, Jhang, and Montgomery.

"The general result shows a large increase in the number of cattle attending fairs, and this increase is almost entirely in the more important fairs, particularly those in the Hissār Division, where the number increased from 78,804 in 1875-76 to 1,02,357. The important and well managed fairs in that division are well appreciated, because they supply a real want. The cattle of that locality are of good quality, and traders from a distance are always pretty sure of finding the kind of animal they require, and cannot elsewhere procure, while the breeders who send cattle for sale are pretty sure of finding customers. The same may be said of the fairs held at Amritsar in spring and autumn, where some 50,000 or 60,000 animals are exhibited, of which a considerable proportion change hands. On recent occasions, horses have also been sent to this fair, and find ready sale.

"The amount of prizes given varies considerably. At the Amritsar fairs, where 68,857 cattle attended, Rs. 2,990 were distributed in prizes, being an average of 8 pies for every animal that attended; whereas in the Hissār Division, the average is under 3 pies. In the latter, moreover, only 144 animals were entered for prizes at all; whereas at the Amritsar fairs 414 were entered. The Amritsar prize scheme has been carefully revised from time to time, and the increasing success of the fairs held there may be due in part to this, but the increasing popularity in the Hissār fairs seems to show that where there is a good market for cattle periodical fairs will flourish, whether prizes be liberally distributed or not. The number of cattle, however, is not the only test of the usefulness of a fair. The quality of the animals is a very important point, and it is chiefly to effect a gradual improvement in this respect that a liberal prize list adjusted with discrimination is valuable.

There is reason to believe that this improvement is really taking place. The demand for bulls of good breed from the Hissār Cattle Farm shows that the improvement of stock is felt to be an object capable of attainment, and well worth attaining.

"In the Sirsa District 40 Hissār bulls were utilized and produced 1,117 head of stock, some of which are very fine specimens. The people appreciate the bulls and their progeny highly. The statement shows that the cattle fairs generally are not only self-supporting, but yield a considerable surplus, which, under present arrangements, is credited to the provincial revenues. The income was Rs. 26,778, and the expenditure Rs. 12,666, leaving a surplus of Rs. 14,112. The minor fairs are not, as a rule, self-supporting, their first starting, and their maintenance for some time, being dependent on the existence of a surplus derived from other fairs. These small fairs, however, serve many useful purposes, and need not be hastily abandoned merely because they cannot at first be taxed in proportion to the expenditure incurred on them. Independently of their value as cattle markets and as a means of supplying an improved breed of cattle, they are popular as local gatherings. At Hoshiārpur a local industrial exhibition was held in conjunction with the cattle fair, and was thought to be a great success. But where the results continue year after year to be incommensurate with the efforts made, and the expense entailed, fairs are sometimes discontinued, as was found necessary recently in the case of the fairs in the Jhang and Montgomery districts.

"The income is raised by means of fees, which are levied in some cases on all animals attending the fair, and in others on all sales effected. In the Hissār and Sirsa districts the latter system is adopted, in Rohtak the former. In Amritsar there is an admission fee for all animals attending, and a separate fee for animals entered for prizes. In almost all cases the fees are collected by direct agency, the employment of contractors having been found disadvantageous.

"Of the Rs. 12,666 expended on cattle fairs, Rs. 6,446 was for prizes, and Rs. 6,220 for expenses of management."

STATEMENT showing the result of CATTLE FAIRS held in the Punjab during 1876-77.

Districts in which fairs are held.	Number of fairs held in the year.	Number of cattle that attended.	Number of cattle entered for prizes.	Amount given in prizes.	Amount of fees collected.		Amount of expenditure other than for prizes.	Total expenditure.	REMARKS.
					On total number.	On animals competing for prizes.			
Hissār - - -	2	28,806	81	Rs. 819	Rs. 7,811	—	Rs. 665	Rs. 1,484	
Rohtak - - -	2	47,417	54	476	2,970	3	432	908	
Sirsa - - -	1	26,134	9	234	6,346	—	232	466	
Jullundur - - -	1	799	17	325	96	—	152	477	
Hoshiārpur - - -	1	245	93	499	—	14	849	*1,348	
Amritsar - - -	2	68,857 and 2,015 horses.	414	2,990	8,552	414	3,703	6,693	
Gurdāspur - - -	1	569	18	16	36	6	6	22	
Gujranwāla - - -	1	6,393	31	220	485	—	27	247	
Ferozepore - - -	1	1,026	31	387	45	—	84	471	
Jhang - - -	1	69	6	90	—	—	—	90	
Montgomery - - -	1	2,712	27	390	—	—	70	460	
Total - - -	14	1,83,027	781	6,446	26,341	437	6,220	12,666	* Rs. 512 were expended on the local exhibition held at the same time as the cattle fair. The District Fund contributed largely to the expenditure.

Horse Fairs.—Besides the two Amritsar fairs above noticed, where horses are brought for sale to the number of about 2,000 each year, three large horse fairs are held in the Punjab, at Rawalpindi, at Jhang,

and at Sakhi Sarwar in the Dera Ghāzi Khan District. Attempts are being made to start fairs at other places, but these three are the most important. The number of horses which attended these fairs, and the amount of

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PUNJAB.		No. of horses attending.	Aggregate value of prizes distributed.	Aggregate value of sales.
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Fair.				
Rawalpindi		2,250	8,000	78,500
Jhang		500	2,000	—
Sakhi Sarwar in Dera Ghazi Khan		1,200	2,000	13,500

The Rawalpindi fair has been held from a very early period of our rule; the others are of later origin. The object of these fairs is to encourage horse breeding among the agriculturists of the neighbouring districts. Our native cavalry have always been mainly mounted by horses indigenous to the country; and it is hoped that eventually a still larger and more powerful breed of horses may be thus obtained. In aid of this object, a number of stallions (English, Arab, Stud-bred, and Walers) are kept up by Government, and distributed each winter for service in the districts where the best breeds of horses exist; and all mares previously shown to a veterinary surgeon and branded by him as sound and fit, are served by these stallions without charge. The number of mares so branded is 2,000. In 1864 the number of stallions thus distributed in the principal horse-breeding districts of the province was 43; the present number is 130, viz. :—

English thorough-bred	-	19
Half-bred and Norfolk trotters	-	25
Walers	-	5
Cape	-	1
Arabs	-	45
Stud-bred	-	35

Among a limited number of agriculturists in the portion of the Punjab west of Lahore the horse breeding thus encouraged is of a highly remunerative character, and adds much to their prosperity.

Agricultural Exhibitions.—In the year 1864 an exhibition was held at Lahore, in which specimens of the raw products, manufactures, and machinery of the Punjab were collected from every district and political dependency of the Punjab. The exhibition has produced two permanent results of great value.

The exhibition building, and a very large portion of the articles exhibited, have been formed into a permanent museum. The charge of the museum (for which Government have granted a small allowance) is usually held by some civil officer, selected from those stationed at Lahore for his special qualifications.

The number of visitors has increased from 50,000 per annum six years ago to 130,000 in 1876–77. Nine-tenths of the visitors are natives, most of them being country people (agriculturists and traders). The contents of the museum are being added to year by year, and are of great interest and value.

The other permanent result was the preparation by Mr. Baden Powell, C.S., of two volumes, describing the Punjab products and Punjab manufactures shown at the exhibition.

Both subjects are dealt with very completely; and the Administration and the public have at their command in these volumes a complete account of the products and manufactures of the Punjab, such as, but for the exhibition, there would have been little prospect of our obtaining.

Agri-Horticultural Society of Lahore.—I have described, one by one, the different items, in respect of which attempts have been made to improve the agricultural resources of the province. It remains to state how far those attempts have been assisted by private efforts or societies. Immediately after the annexation of the Punjab, the Agri-Horticultural Society was formed at Lahore. The society consists of gentlemen (European and Native) residing in the province; who are nearly all of them members of the various Government services. It is nominally independent of Government, and its formation arose out of the interest felt in the development of the country by

the officers employed in it. In the first years of its existence the inquiries of the society resulted in producing some of the best accounts of agriculture in the Punjab which have yet been written. Horticulture, arboriculture, wool, silk, sugar, and other important products also formed subjects of inquiry by the leading members of the society, the results being recorded in the society's proceedings.

Its gardens at Lahore, the seeds of flowers, vegetables and trees, which it distributes to the head-quarters of each district in the province, and its efforts to introduce and distribute new varieties of agricultural and horticultural produce, are of great value, and in these respects the society supplies a want which could not be met in any other way.

Nearly three-fourths of the funds, however, by which it is supported are supplied by Government: thus the society's budget for 1877–78 shows the following estimated income :—

		Rs.
Contributions from	Imperial revenues	- 5,400
	Provincial revenues	- 3,600
	Local and municipal rates (each district of the province contributing)	- 6,150
	Subscriptions of members	1,100
	Sale of garden produce, &c.	4,740
	Total Rs.	- 20,990

The society's permanent establishments at Lahore cost Rs. 11,750; and it expends in the purchase and import of seeds from Rs. 4,000 to Rs. 5,000 per annum.

Efforts of European enterprise.—I have already noticed under the head of flax the efforts made by certain merchants of Belfast to develop the growth of flax; and also under the head of tea the success of the European planters in Kangra. Two other English merchants, Mr. Cope and Mr. Coates, of Amritsar and Ferozepore, made valuable efforts a few years ago to develop the trade of the province with Europe, especially in cotton. Similarly, the late Mr. Halsey's enterprise in silk in the Gurdaspur District, the sugar factory which he started in 1877, and his successful use of English ploughs on the small farm which he cultivated, are noteworthy instances of the value of intelligent European enterprise, and of the results it would effect if it could be attracted to the province.

But the Kangra tea industry, and a few other instances such as those above noticed being excepted, the Government is as yet entirely dependent on its own exertions and on those of the officers in its employ for the improvement of the agriculture of the country.

In respect of some forms of industry, such as cloth mills (cotton and woollen) and sugar factories, it is probable that their multiplication by independent European enterprise is not far distant. And such industries, if successful, have an obvious and almost certain tendency to promote the agricultural prosperity of the tracts in which they are established. The promoters of them may possibly be led themselves to take a share in the agriculture of the country. But we shall certainly be more than sanguine if we rely entirely on such speculative prospects for the improvement of the agriculture of the country. And it does not seem too much to say, that until Government makes some earnest and systematic provision for the study and observation of the native agriculture, we shall neither adequately appreciate its existing methods, nor succeed in pointing out the directions in which it is practicable for the mass of the agriculturists, circumstanced as they are, to improve those methods.

Deterioration of Soils.—On the question whether the cultivated soil and the crops have deteriorated or not, the replies of 13 officers employed in various parts

of the province, and of one native gentleman, are annexed.

I give a short summary of these replies :—

Colonel Davies, Commissioner of Delhi, has been employed in the Punjab since 1854, principally in the Rawalpindi, Amritsar, and Delhi divisions, states that there has been no deterioration of soil, except on irrigated lands.

The lands irrigated by the Bari Doab Canal and by the Western Jumna Canal have alike deteriorated. The cause is over-cropping, over-watering, and defective drainage.

Alimulla, Honorary Extra Assistant Commissioner of the Rohtak Settlement, Hissar Division, states that in the Rohtak District for five years past he has observed no deterioration either in canal irrigated or in unirrigated land.

Mr. J. B. Lyall, Settlement Commissioner, whose experience has been gaining during 14 years past in settlement operations in the Amritsar, Jullundur, Lahore, Mooltan, and Derajat divisions, has not observed any deterioration of the soil or falling off of the crops within his experience. He states that there is a popular belief that the yield has decreased, the cause assigned being increasing irreligion, but that the true reason probably is that the land gets less rest than before. He believes that it would be very difficult for any official to observe a decrease of this kind. As to irrigated land, without doubt constant cultivation and application of canal water takes the strength out of it, and in the country round Amritsar a decrease in the yield of irrigated land is commonly asserted to have taken place. Over-saturation combined with insufficient drainage has also spoilt some land near the head of the Bari Doab Canal in the Gurdaspur District.

Mr. E. C. Palmer, Superintending Engineer of the Bari Doab Canal, has been employed on that canal for 15 years past; and states that the value of canal irrigation varies with the quality of the soil. Light sandy loam, he writes, is improved by the clayey silt deposited by the canal water, and by the humus left by the crop continuously raised. A stiff clay soil is not similarly improved; but yields less than it would under well cultivation. Clay soils with a substratum of reh are usually injured by canal irrigation; the steady supply of water bringing the reh salts to the surface in great quantity, and rendering it proportionately unfruitful; but there are exceptions to this, for instance, turnips and rice yield well on some reh lands. When land is first aided by irrigation, the crops for four or five years are very luxuriant, thereafter a marked deterioration takes place, but is not progressive. If cultivation without irrigation is attempted on land usually irrigated, a fair crop will not be yielded for some years. A bushel of wheat raised from canal irrigated land will not weigh so much as a bushel raised on well irrigation by $\frac{1}{4}$ th. But in the market there is no distinction of price (presumably, I would suggest, because in India grain is always sold in the markets by weight).

Raja Sir Sahib Dyal, K.C.S.I., a jagirdar magistrate of the Amritsar District, who is a considerable landowner, states that the people commonly assert that canal water has impoverished the soil; but the truth is the impoverishment is due not to the canal water, but to over-cropping. The old custom was to take a spring crop from half the land and an autumn crop from the other half. They now try to take two crops from every field. States that the canal irrigation removes reh salts from the soil; instances a village of his own which has been cured of reh or kallar in this way. Recommends a rule whereby no village would get more water than will irrigate half its land. Complains that villages near the head of the canal get more water than is good for their lands, and that villages further down the canal are consequently stinted of a sufficient supply.

Mr. Palmer, the officer whose report is above quoted, being asked to state whether his experience confirms the complaint last mentioned, replies that the

facts are entirely otherwise. He says that great care has been bestowed on the distribution of the water, and that as a rule no village gets more than will irrigate one-fifth of its area. The figures of the three years ending 1875–6 show that in Gurdaspur (near the head of the canal) villages to which water was supplied irrigated each year only 13 per cent. of their area; whereas in Amritsar and Lahore, lower down the canal, such villages irrigated 24 and 21 per cent. of their area. He considers it wasteful to give canal water in tracts where the spring level is within 25 feet of the surface. Both for this reason and owing to the abundant rainfall, the use of canal water has latterly been discouraged in the Gurdaspur District, and of course the villages lower down the canal benefit proportionately.

Muhammad Hayat Khan, C.S.I., Judicial Assistant Commissioner of Gurdaspur, states that the land and the crops are worse than they were, because the land gets fewer fallows, and is more steadily cropped. The increase in the population has caused the subdivision of many holdings. By stress of circumstances the cultivators are driven to take two crops a year off the land. Canal irrigation facilitates their attempts. When land is first irrigated it yields very richly, but after three years it deteriorates. The irrigation leaves a sandy deposit which is injurious. The remedies suggested by the Zamindars are manuring, rests, and constant ploughings. But they cannot afford to rest the land, and have only as much manure as is sufficient for the very best lands. He recommends that the Zamindars be taught the rudiments of agricultural science. This officer has been employed for 12 years past, principally in the Lahore and Amritsar divisions.

Mirza Azim Beg, Honorary Assistant Commissioner of the Jhelum Settlement, has been employed principally in settlement work in the Gujrat, Hazara, and Jhelum districts for 22 years past; states that the yield of land is less than it was before British rule for obvious reasons. Then the cultivated area was much smaller, and therefore the best lands were selected for cultivation. For the same reason more pains could be spent on them. And the large waste areas enabled the agriculturist to keep more cattle; though cultivation has now doubled in extent, population has not increased in the same ratio, consequently the agriculturist's labour is divided over a larger area than before. At the same time the cropping is more steady than it was in less peaceful days. States that the universal conversion of the wood and grass-bearing area is seriously injuring the agriculturists by reducing the number of their cattle and their ability to keep cattle, and that every village ought to be obliged to keep one-tenth of its area under grass and copse, or such preserves should be provided in some other way. Their non-existence is an evil hardly less important than the indebtedness of the agriculturists, and will as certainly shortly claim Government's earnest attention.

Mr. P. O'Brien, who has been engineer of the canals in the Mooltan District since 1850; Mr. Roe, who has been settlement officer of the same district for 5½ years; and his native assistant, Hukm Chand (extra assistant commissioner), who has been in the district for the same period; all state that no deterioration of soil or crops is taking place; and that irrigation does not injure the soil. In this district the canal irrigation usually enriches the land with alluvial deposits; the lands on the river banks are similarly enriched by autumn floods; and where land is irrigated by wells only, land is so abundant that yearly fallows are always observed. This is an almost rainless district, and speaking broadly, cultivation, unless aided by river floods or irrigation, is impossible.

Mr. E. O'Brien, the settlement officer of the Muzaffargarh District, which adjoins Mooltan, and is similar to it, on a 5½ years' acquaintance with the district, has arrived at the same conclusion. Native memory looks back with gratitude to the last of the Sikh

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governors, Sawan Mal, and says everything was best in his time. But native opinion does not assert that land and crops are deteriorating. Mr. O'Brien has compared his own estimates of produce with similar estimates made in the early years of our rule, and the comparison shows no falling off in yield. Canal irrigation improves the land, no matter how often repeated, and where noxious salts have accumulated on the surface, washes them away.

Mr. H. St. G. Tucker, who has served for the past 10 years in the Dera Ismail Khan District, principally as settlement officer, has noticed no general deterioration of the soil. There is no canal irrigation to speak of in this district.

The alluvial lands in the Indus yield more richly when first cultivated than they do subsequently, and when old, get poor and weedy. Ten years ago a great deal of such land had only been lately reclaimed. Nearly all the rest of the cultivation in this district is annually enriched by floods from the hills.

Mr. S. S. Thornburn, who has served for 10 years in the adjoining district of Bannu, principally as settlement officer, gives a similar opinion; there has been no deterioration speaking generally. In Marwat, a sandy unirrigated tract, dependent on a scanty rainfall, occasional dry seasons create enforced fallows; on the canal lands of the Kurram the irrigation enriches the soil with silt.

Major E. G. Hastings, who has served in the Peshawar District for the 12 years ending 1875, and subsequently in the Kohat District, principally as settlement officer of these two districts, states that on irrigated lands he has observed no deterioration; but that on lands dependent on rain he has observed that the crops on such lands when newly cultivated are richer than on similar adjacent lands which have been longer under the plough. Native opinion asserts that the soil has deteriorated, and gives the following reasons for it: increased population, and consequently more frequent cropping with fewer rests; increased uncertainty and unseasonableness of rainfall; less careful cultivation consequent on increased employment of tenants and go-betweens. They admit, however, that the land will yield as well as ever with fair treatment.

I have myself served over six years (1868-74) in the Hazara District, as settlement officer, and subsequently as settlement officer and deputy commissioner in the Jhelum District; and I do not think it can be stated broadly that land has deteriorated in productive power. There is much force in what is above stated by Mirza Azim Beg, who has worked in the same districts as myself, but I think he generalises too much. Under the Sikh rule the cultivation in some tracts was good, in others, especially the more unsettled tracts, it was rough in the extreme. Under our rule all parts of the country are equally peaceful, and tracts before roughly cultivated are now vastly improved. Similarly, though it is of course the case that land when first brought under the plough yields more richly than it will after three or four crops have been taken off it; I think it is scarcely correct to describe this difference as deterioration of soil. The practical question appears to be this: after the superabundant richness of the first three years has been worked out of new lands, do such lands under the existing system of cultivation continue to deteriorate progressively, or do they give a steady fair yield proportionate to their natural quality? I have not observed any progressive deterioration of this nature. Similarly, it is quite true that the average yield reckoned on the total area cultivated is lower than it was; or as an agriculturist would perhaps put the statement, after the division of his heritage between himself and six other brothers, much of the land he holds is such as his father 30 years ago would have thought poor stuff. But the obvious explanation is, that it is profitable to cultivate now poorer soils and more distant fields than before our rule. On the other hand, during the past 30 years, a large proportion of the cultivated fields have been much improved,

as I proceed to explain. Some open valleys excepted, Hazara is a purely mountainous district, consequently nearly all the fields when in their natural state are sloping; and I have no hesitation in saying that a vast improvement has taken place during the last 30 years in the character of the Hazara cultivation, by the conversion of these sloping fields into fields level and well terraced. This is not done by the expenditure of money, but by quiet industry, little by little, year after year. Jhelum is not so mountainous a district; it has hilly tracts, but its main features are high undulating plateaux much cut up by ravines. Here also the fields in their natural state are usually more or less sloping; the banking up and levelling of the fields was consequently always a prominent feature in the agriculture of the district, but the fields are much more universally banked up and well levelled now than they were at annexation 30 years ago.

In purely hill tracts, and in level tracts at the base of hills, the cultivator has facilities for renovating his lands which are peculiar to land so situated; that is to say, he can flood his land with the drainage of the adjacent hills, and as a matter of fact such a natural advantage where it exists is never neglected.

Deterioration of Land by Reh or Kallar.—There is one wide-spread form of deterioration in the lands of the Punjab plains which deserves special notice. Reh or kallar consists mainly of a mixture of sulphate and carbonate of soda with chloride of sodium in various proportions. The reh crops out on the surface of soil affected with it a white efflorescence. Its first action is to absorb moisture and keep the ground dry. But when water is added in sufficient amount it dissolves; and the solution, unless greatly diluted, prevents the absorption of liquid by plants, stunts their growth, and eventually kills them.

Large tracts of land in the Punjab are thus injured. Speaking roughly, the evil is most wide-spread in the lands irrigated by the Western Jumna Canals, and in the clayey soils of the southern portion of the Punjab. Where it occurs in any appreciable degree, it makes the land barren for the reasons above given. It has consequently been the subject of much investigation. It is now well established that it is not usually conveyed to the soil by canal water or other sources of irrigation. It exists in the soil originally in a diffused and harmless proportion. It is collected on the surface to a harmful extent usually in one or two ways.

(1.) When land is over-irrigated, or otherwise becomes swampy, the reh collects on the surface of the soil and in its upper layer; on such land it can be cured by plentiful irrigation, accompanied with really efficient drainage. The water liquifies and dilutes it, and if there is proper drainage, washes it off the land.

(2.) In the clayey soils of the southern plains of the Punjab, which are almost rainless, the occasional showers or limited irrigation are sufficient to bring the reh to the surface, but not sufficient to wash it away, and the evil is in such instances incurable, except by irrigation and good drainage as above described.

In 1865 specimens of soil impregnated with reh, and of adjacent water and subsoil were forwarded to England for chemical analysis. The analyst (of the Royal School of Mines) came to the conclusion that the only practical remedy was irrigation accompanied by efficient drainage. This was practically the same conclusion as was arrived at by the canal engineers of the Punjab, Major Fulton and Mr. Garbett, whose reports accompanied the reference to the analyst. The same view is held by Doctor Burton Brown, an officer whose opinion was based both on scientific analysis and on practical experience in the reclamation of such land in the gardens of the Agri-Horticultural Society, Lahore. It will be found expressed by Raja Sir Sahib Dyal, of Amritsar, as his experience on his own lands, and by the settlement officer of Muzaffargarh, in their replies to the question under consideration. Also, if the replies to Chapter IV. (Irrigation Works) be referred to, it will be seen that the settle-

ment officer of Mooltan, the canal officer of the same district, Major Grey, whose experience extends both to Ferozepore and to Bahawalpur, and the Deputy Commissioner of Shahpur, all hold the same opinion. Mr. Palmer, the superintending engineer of the Bari Doab Canal, in his replies appended, Nos. 6 and 8, dissents from this conclusion, believing canal irrigation to be necessarily injurious to land affected by kallar.

I note below* the best papers on the subject, not filed with this report; on the whole evidence there seems little doubt that plentiful irrigation aided by good drainage will usually cure land affected by reh; as certainly as the reckless irrigation of clayey soils and simultaneous neglect of all provision for efficient drainage will develop it in most parts of the Punjab plains.

General Conclusions.—The general conclusions to be drawn from the opinions above summarised appear to be as follows:—

Irrigated Land.—In the Delhi and Karnal districts such land has greatly deteriorated by excessive irrigation, and by the absence of efficient drainage. The Western Jumna Canal, which irrigates these districts, was constructed by native rulers, and was greatly developed by us subsequently to the famine of 1833. But neither in its original construction, nor in its subsequent development, was any regard paid to the drainage of the country irrigated. The natural lines of drainage were dammed up by the canal and its cuts, the soil became a swamp, and the whole population were

* 1. Circular Government of India, Department Public Works No. 23, dated 24th March 1869, and proceedings Punjab Government, dated 26th April 1869, being papers forwarding for analysis specimen soils from Western Jumna Canal with analyst's report.

2. Selections from records Financial Commissioner Punjab No. 15 (1874) concerning reclamation of reh land (which includes Doctor Brown's opinion).

3. Proceedings Punjab Government December 1873, containing a report on reh efflorescence by Civil Surgeon of Karnal.

4. Report of Settlement Officer Karnal, June 1877, on re-assessment of Tahsil Panipat, paras. 111 to 124.

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1. In this reply a brief attempt will be made to show what has been actually accomplished up till now in the direction of improving the existing staples of the country or the system of cultivation, or of introducing new staples.

2. The staples to which the special attention of the North-Western Provinces Government has been drawn are—tea, rhen, cinchona, tobacco, silk, cotton, and sugar.

3. **Tea.**—The introduction of this most important staple into Upper India, and thence to other parts of the Peninsula, is one of the most remarkable successes in an agricultural direction which the Indian Government has achieved. The first serious attempt was taken in hand not much more than 40 years ago by Drs. Wallich and Falconer, superintendents of the Botanical Gardens at Saharanpur, in the North-Western Provinces, in pursuance of measures instigated under Lord Bentinck. Gardens were established at different elevations in the Himalayas and in the Dun, where the experiment of naturalizing the China tree was tried; the cost of these experiments, which included the importation of several Chinamen, and the struggle with the initial failures and disappointments that rendered success for some years doubtful, and would probably have broken the spirit and fortune of any individual pioneer, were borne by Government until at a period which may be roughly given as five and twenty years ago, the new industry had established its ability to stand alone. Then the Government tea plantations were sold, and the extension of the industry was left to private enterprise, which quickly carried it to the more prolific regions

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disease-stricken. These evils are now after many years being gradually remedied by the re-alignment of the canal and its distributaries, and by making proper provision for the drainage of the country.

Limited and exceptional instances of similar deterioration occur in the upper part of the Bari Doab Canal. But with these exceptions, irrigation from this canal has not deteriorated the soil, except so far as it has been combined with over-cropping. Such over-cropping is common at the first introduction of canal irrigation in tracts where it has not before existed. The deterioration is mainly of the nature of exhaustion, and is not progressive after a certain point has been reached. Arrived at that point the land continues to yield fair and assured crops at a cost much cheaper than is possible without canal irrigation. The deterioration occurs principally on clayey soils.

On the inundation canals of the Mooltan Division and of the Shahpur District no deterioration has yet been caused by irrigation.

Unirrigated Lands.—There is no evidence of general deterioration of soil. A greater proportion of inferior land can now be cultivated with profit than was formerly the case, and so the average yield of land reckoned on the total area cultivated is probably lower than it was. The old wastes which have been brought under cultivation from time to time since annexation do not yield now so richly as when first broken up, and land generally gets fewer rests than it used to do. Also neither the population nor their cattle have increased in the same proportion as the extension of cultivation. All these causes tend to lower the average yield of cultivated land. But there is no evidence that the natural powers of the soil are becoming exhausted; or that the yield of the crops cultivated have decreased out of proportion to the greater frequency with which the land is cropped. In tracts where the rainfall is small and uncertain the consequent occasional failure of crops dependent solely thereon acts as a natural protection against over-cropping.

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of Eastern Bengal. The tea of the North-Western Provinces is now bought chiefly by native traders from Cabul and Central Asia, but it must always be recognized that this was the pioneering province which laid, after many troublesome struggles, the first stone of the important export trade which at the present time is so firmly established.

4. **Rhea.**—The object here is not so much to grow this plant, but to discover the best method of preparing its fibre for use. A small reward of 500*l.* was offered for the invention of suitable machinery, but as it did not succeed in attracting anything completely satisfactory, a larger reward of 5,000*l.* has been advertised, and several competitors from different parts of the world have now entered machines. The competition will take place in the autumn of 1879; meanwhile rhea plants have been grown in abundance in the Saharanpur Gardens and in Dehra, and specimens are shown in the Saharanpur Museum of the fibre that can be produced from it, and the uses to which that fibre can be put.

5. **Cinchona.**—Attempts have been made in this province to grow the tree in every likely altitude and temperature, but in vain. The dry heat of the plains and the frost of the hills are equally fatal to it, and even in the warmest and most protected Himalayan valleys, the plants, after growing promisingly for two or three years, were cut down by a night's frost.

6. **Tobacco.**—On this subject Mr. Buck writes as follows:—

"An experiment in tobacco cultivation was set on foot at Ghazipur, under the Department of Agriculture in 1875-76.

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"The Government of India,* having removed the horse-breeding stud from that station, and desired that some portion of it might be devoted to the purposes of a model farm, Sir John Strachey sanctioned the proposal to enter into arrangements with the firm of Messrs. Begg and Sutherland (of Calcutta and Cawnpur), to utilize the stud lands as an experimental tobacco farm. The terms which have been made are these: about 1,200 acres have been rented for five years at Rs. 5,000 (about half assets rates) to the firm, who have been allowed a rent-free use of the stud buildings as curing-houses, &c., on condition of their importing from Virginia a carefully selected tobacco curer, and placing a certain acreage each year under tobacco, and of acting under the general superintendence of the director, at whose disposal all information acquired and all the results of their experience are to be placed.

"The curer, to whom the firm of Messrs. Begg and Sutherland pay 300*l.* a year, arrived in January 1876, just before the cutting season for that year commenced. He was carefully selected by the tobacco exporting firm of Messrs. Campbell & Co., and is well skilled in all branches of tobacco preparation and manufacture. The tobacco was, most of it, raised from imported Virginia seed, and although said to have been badly cultivated, received a favourable opinion from the Virginia curer, who cured a sufficient quantity to send as samples for opinion and valuation to the English and Australian markets, in the former of which it has been classed at a price which is sufficiently high to encourage further efforts, and which raises the value of the produce of one acre from 3*l.* or 4*l.* to 10*l.* or 15*l.*"

"In 1876-77 a crop had been raised from 52½ acres at Ghazipur; a severe hailstorm reduced the value of the crops, according to the firm's estimate, by fully one-third. The out-turn was nearly 59,000 lbs., exclusive of second cuttings retained by cultivators, but was not sent to England on account of its being so much broken by hail."

"The ensuing drought, which was extreme at Ghazipur in 1877, prevented the growth of anything like a good crop at that farm; but the firm had, in anticipation of obtaining Pusa, secured a second professional curer and manufacturer from America (Mr. Cabaniss), who arrived in time to raise an excellent crop on 200 acres at Pusa, a result which justified my conclusions previously placed before Government, as to the greater suitability of the Upper Bengal climate for tobacco. At Ghazipur, however, there was as much difficulty experienced in keeping the crop alive as the curer, and on 60 acres the out-turn was only 50,000 lbs. of an inferior quality.

"The Pusa crop on 200 acres realised an out-turn of more than 150,000 lbs., of which 15,000 lbs. have been sent to England, and valued at prices varying from 2½*d.* to 5½*d.*, but the brokers say that it would have fetched more if it had been kept longer in this country to mature. Of the remainder a large quantity will be manufactured, and a portion sent to England as cured leaf."

"The results of the operations hitherto undertaken are still uncertain. The firm are sanguine, and I am sanguine, as to ultimate success, but time is still wanted. A crop sown in July 1877 is cut in January, cured by March, sent home in the rains, kept in bond for a year (two are better), and opened for sale in 1879. Of all the tobacco sent home only the small parcels of 1876 (which were the produce of a crop injured by hail and grown in a dry season) have been tested in the market. They realized a price three

times as great as Indian leaf previously exported, and about two-thirds the price of American leaf of the same class. The smoking mixtures prepared for European use in India are becoming very popular.

"A comparison of tobacco with tea may give some idea of the possible position which the former may take as a product of India. An acre of tea produces in Eastern Bengal about 300 lbs. on the average; three or four years elapse before it begins to yield, and full vigour only lasts for a few years without expensive manuring. Cost of cultivation and manufacture is given at various rates, but there is reason to believe that, including export, it is not less than four annas a pound. The average price, good leaf and bad, is said not to exceed nine annas a pound. At these rates net profits on 100 acres would be 300 × 5 annas × 100 = Rs. 9,375. An acre of tobacco produces about 800 lbs. on the average; cost of cultivation and curing can, including export, be kept probably to two annas, and if manufacture is added to three annas. The price of cured leaf ought to be, if it is to compete with American tobacco, 6*d.* a pound, or four annas, and of manufactured tobacco in India about 10 annas. The minimum net profits of 100 acres at these rates are 800 × 2 annas × 100 = Rs. 10,000 for cured tobacco, and Rs. 800 × 6 × 100 = Rs. 30,000 for manufactured leaf.

"The above figures show that there is as good, if not a better, margin for profit in tobacco than in tea. The market in which it competes is of larger extent, and it is almost proved that tobacco cured in India can be sold in London at a profit for a price at which it would not pay America to send it."

7. *Silk*.—The mulberry tree, of which the delicate leaved varieties cannot live under the fiercely heated western blasts of summer in the plains, thrives in the mild climate of the Dún; and this fact suggested the possibility of planting a silk-growing industry there. The place has the further advantage that the eggs can easily be sent up to be kept in the cold climate of the higher hills, and brought down by relays to be hatched as required, thus enabling strong worms to be produced at the most favourable seasons, and avoiding the deterioration suffered in Eastern Bengal by constant hatching in warm months. The experiment is still in its infancy, but if it succeeds the intention is to naturalise it among the people, so as to give them remunerative employment at their homes in leisure hours in rearing the silkworms. Mr. Buck says:—

"The silk farm is under the personal charge of Mr. Ross, Superintendent of the Dún, who in the year 1877-78 brought operations through to a third season. The second season was a failure owing to Mr. Ross's absence, but in this year he made some progress. The annual report states that 'the practical points of success were the health of the acclimatized worms and the large weight of good silk produced from good cocoons.' Which facts taken together prove that good silk can be successfully produced in the Dún. Professional opinion on the silk has not yet been received, but it is understood that a Calcutta firm is so well satisfied with the prospects offered that they have undertaken to establish a filature near Dehra."

8. *Cotton*.—In the beginning of the century, when the Company were merchants as well as rulers, large cotton farms were established in Bundelcund at Kalpi and Banda, both to improve the growth of the staple and to buy it up and send to Calcutta. This was before the American cotton had begun to take possession of the market. But the records relating to these early commercial enterprises have almost entirely disappeared.

9. *Cotton Farms*.—Cotton, however, revived again during and after the American war, 1862-65, and then the same impulse from Lord Mayo in the direction of agricultural improvement (1871) which created the Department of Revenue, Agriculture, and Commerce of the Government of India, led to the establishment of three farms in the North-Western Provinces, which were indifferently called Cotton, Model, and Experimental farms; and as at this time

the operations of the cotton department in the Central Provinces and Berar were being curtailed, several men who had been brought out to serve under it were employed as superintendents of these farms. Unfortunately, they were gardeners and not farmers, and failed to improve decisively the indigenous cotton which was the first operation entrusted to them.

Experiments have, however, been revived under the Provincial Agricultural Department. It had been proved perhaps conclusively that the finer fibres of American and tropical staples could not be obtained in the drier and more temperate climate of Upper India, but that it might be possible to produce a better indigenous cotton of a staple, too short and rough it is true for exportation to England, but sufficiently good for the coarser gins and looms of Indian mills. This is the object to the attainment of which, by selection of indigenous seed and improved treatment, experiments are now being directed. It will for the future be an object to avoid the long fine staples which are useless to the coarse machinery of Indian mills.

10. *Sugar*.—Has not perhaps received the attention which the importance of the product deserves. The sugar of Upper Bengal and the N.W. Provinces, known in the trade as Benares sugar, was at one time imported to England in much larger quantities, but at the present time the exports are insignificant. It quickly lost any place which it might have had in the estimation of home manufacturers by its low character and admixture with pithy fibre, and it is only used now for brewing and other inferior uses, having been abandoned even in the dyeing trade on account of its fibrous admixture.

11. Attempts were made in the early days of the East India Company to promote the industry in Upper India. Very large advances were given for sugar growing, and the factors in charge of districts in the neighbourhood of Benares, introduced sugar mills which (as Sir H. M. Elliot mentions) were found to be much less effective than the rude sugar mill of the country. As in the case of cotton, records of these early enterprises have almost disappeared, but the still existing ruins of sugar mills testify to many a complete failure and many a broken fortune. The chief mistake appears to have been the concentration of operations in large central establishments which led to the deterioration and evaporation of cane juice during the carriage of canes to the factory, for it is now well known that juice ought to be expressed and boiled as soon as possible after canes are cut.

12. The efforts of the Director of the Agricultural Department are now being directed to the improvement of the small local mills, and the native system of boiling and preparing sugar in the rude furnaces erected near the cane fields, in other words, attempts are now being made to work up from below instead of (as formerly) from above. The native mill, a sort of pestle and mortar on a large scale, effective as it is in expressing a maximum amount of juice, tears the coat of the cane to shreds and produces the fibrous admixture complained of in England, while the system which it compels of chopping the canes into small pieces leads to exposure of the juice to air and chemical deterioration. On the other hand, the prevailing methods of boiling and preparation do not follow the principles required for successful granulation of the good sugar. These defects are now the subject of special investigation by the local Agricultural Department which has invited the further assistance of European planters in providing remedies. The successful lead given by Messrs. Thomson and Mylne in the invention of a portable mill by which canes can be crushed uncut is noticed elsewhere. The mills are being rapidly introduced in the North-Western Provinces.

13. *Farms*.—The cotton farms established in consequence of the American war have been noticed above in paragraph 9. They were established primarily for cotton culture, but developed subsequently into institutions of a more general character. They were situated at Bulandshahr, Allahabad, and Cawnpore.

Being as explained under superintendents whose education had been too purely horticultural, they never succeeded in showing any progress in an agricultural direction. Three years ago the Cawnpore man being wanted at Calcutta, Government decided to close the Bulandshahr Farm from which no results had ever been obtained. There are now two farms, viz., at Allahabad and at Cawnpore. The latter being placed under the management of a European planter of experience.

14. *Farms now maintained*.—The Allahabad Farm is in an unsuitable position to be used either for experiments or as a model farm, since it is situated in the rich moist land of the old bed of the Ganges, and its conditions are altogether abnormal. It was decided, therefore, only to keep a small area of less than 50 acres under Government charge, and to rent the remainder (about 100 acres), in order to test the value of the English ploughing and manure with which the land had been treated for six years. The superintendent is now required to supervise and keep a scientific record of operations connected with a newly established sewage farm, i.e., a farm on which the street and latrine refuse of Allahabad are agriculturally utilized. An experiment (of measured value) has been brought into working order on a large scale, which will help to decide for all large towns in India whether the agricultural method of utilizing city refuse is or is not remunerative.

15. It is sufficient in this place to indicate that land manured with latrine poudrette or night-soil brings, without irrigation, about Rs. 20 an acre, and with irrigation about Rs. 40 an acre, more than the ordinary rent on leases of not less than five years. It is worth mentioning that at Cawnpore some land (where canal water and latrine manure are unlimited in supply) has lately let at more than 20*l.* an acre. The enhancement of income which is estimated for the city of Allahabad, when the system is completed, is Rs. 10,000.

16. At the Cawnpore Farm experiments have been made in introducing new seed—wheat from England, cotton from Central India, Carolina rice, Otaheite sugar-cane, &c., but none of these have had any success; and the chief use to which the farm is at present put is as a field in which to make experiments on machinery, chiefly ploughs, winnowing machines, and water lifts. The Cawnpore Farm is intended to take in future a more prominent position as the one experimental farm of the province and has been now established as the head-quarter of the Director of the Agricultural Department.

17. On this subject Mr. Buck writes:—"This is hardly the place for a dissertation on the difficulties in detail of grappling with Indian agriculture, but it is impossible to explain or to justify the course which has been adopted in this province without some remarks on the subject, which will, however, be made as brief as possible.

18. "In the first place, we have to deal with a climate and with conditions of soil completely at variance with those of England. The most skilled English agriculturists ought, therefore, to have the greatest diffidence in proposing any change founded on English experience, in a system of cultivation which has been evolved by centuries of 'natural selection.'

19. "The chief objections to English machinery (the word is intended to include 'implements') are—first, the price, utterly and completely out of the reach of the mass of Indian cultivators; the second is the cheapness of labour with which machinery has to compete; and the third is their unsuitability to Indian conditions.

20. "We have therefore to begin—firstly, by reducing the cost of construction of machines; secondly, by limiting our machines to those which will increase the effect of available labour rather than economise or provide a substitute for labour; thirdly, by modifying the machines until they are suitable for Indian conditions; it follows that until these objects are effected, we cannot, so far as machines are concerned,

* Annual Administration Report of Department of Agriculture and Commerce, North-Western Provinces and Oudh, for 1877-78.

CHAP. I. QN. 7.

NORTH-
WESTERN
PROVINCES
AND OUDH.

Mr. Buck and
Mr. Elliott.

P. I. QN. 7. come forward to advise natives to adopt any class of machines, or to attempt to instruct them in their use.

21. "The second point noticed requires illustration by a practical example. A well bucket (A.) has been invented which is drawn by one bullock and one man, the ordinary bucket in use (B.) is drawn by two bullocks and two men; B. raises less than double the water raised by A. But A., though it economises labour, does not increase the effect of existing labour. B. gets more out of existing labour than A., the number of wells remaining the same. For this reason cultivators prefer B. to A.

Buck and
r. Elliott.

22. "If, then, the position assumed is accepted, that we must ascertain how machinery can be adapted to meet native conditions, before attempting to introduce them or instruct others in their use, then the first step is to choose the class of machines to be adopted, the second to adapt them, the third to introduce them. 'The machines (the term including, as explained, 'implements') first to be taken in hand are undoubtedly—(1) ploughs, (2) water lifts. A native wants a plough—

- (1) which he can carry;
- (2) which his cattle can pull;
- (3) which can be repaired by native smiths;
- (4) which is very cheap.

"Some trouble has been taken during the last two years at Cawnpore to provide such a plough, and all the required conditions are now fulfilled to a promising extent. The next step is to introduce it. This we are attempting on the Court of Wards estate, on the use of which estates remarks will be made further on. There are two modified ploughs now made at Cawnpore, one for Rs. 4, the other for Rs. 8 or 9; the first being less effective than the second but of lighter draught. The price is far lower than anything yet reached. Imported ploughs cost from Rs. 20 to Rs. 30 each. Already several cultivators have made *bond fide* purchases of the new ploughs.

23. "The next 'machine' is the water lift, with which we have not made so much progress. Our farm superintendents have been useless in giving any aid in this direction, and I have been helped far more by the American tobacco farmers at Ghazipur. I have referred to the modified hand lift, on the pattern of an Australian pump which I brought from Melbourne, in a note on wells under question 4, and the Famine Commission saw at Ghazipur the rough construction, which was the first attempt at a cheap modification. There is reason to believe that it can be made for Rs. 10. The Government workshops at Roorkee are now supplying the Cawnpore Farm with every kind of water lift which appears to have any chance of success, and works are under construction which will enable them to be tested and compared.

24. "The only instance in which I am aware of a new machine having been largely adopted by natives is that of the small sugar mill invented by Messrs. Mylne and Thomson. It is a significant fact that these gentlemen have taken some years to modify the machine to its present form, adding a little improvement year by year. The cultivators who have taken it are now numbered by thousands.

25. "This fact supplies three lessons: one, the necessity of patient application in the study of adaptation of machinery to Indian wants; the second, the desirability of appealing to a native verdict; the third, the absurdity of condemning all attempts at improvement as hopeless; the fact being that hitherto what few attempts have been made have been made on unsound principles. In other cases too it has been found that whatever the native cultivator ascertains on trial to be profitable he will adopt. The extension of indigo, potatoes, opium, and other new staples, some of which were opposed by religious prejudice are cases of older standing. Brahmans now grow indigo whose fathers would not have dared to touch the unclean plant."

26. *Botanical Gardens.*—Besides the farms there are two other institutions of older date—the Botanical

Gardens at Saharanpur and at Lucknow. The former is under the charge of a scientific botanist, and the botanical collection of trees and shrubs is one of great value and is rapidly increasing. It is also used to grow vegetable seeds for distribution to soldiers, and to raise fruit and other trees for roadside avenues and gardens. The Lucknow Garden has chiefly been kept up for horticultural purposes, and the acclimatization of flower and vegetable seeds.

27. Mr. Buck writes:—"The farms which Government maintain cannot, as above noted, be termed model farms, partly because for one thing in which we can beat the native, he can beat us in a hundred, and partly because if the farm was cultivated on Government account, speculation and dishonest labour would destroy the value of every result. As it is, native dishonesty goes far to impair the value of experimental cultivation, but it would absolutely ruin any attempt at model farming. Every man employed to cut the crops, to thresh, winnow or store the grain, or to sow the seed, takes something of what passes through his hands, and thus prevents accuracy of measurement, while by shirking their work the cultivating labourers prevent accuracy of the record of cost. The only hope of ensuring true experiments is to adopt a system under which cultivators will carry them out on their own lands for their own benefit. This is now being commenced on Court of Wards estates.

28. "I do not think this province is yet ripe for the establishment of a training establishment. We have too little to teach and too much to learn. When we have discovered what plough to use, what water lift to adopt, what staples to recommend, what system of cultivation is better than the native system (hard, I suspect, to beat), then we ought to train men to carry our improvements through the country. I do not mean that nothing would be gained by an education in knowledge of agricultural facts, but that at present an attempt at education in practical farming would be too little productive of results. What we require at the present stage is the application of scientific inquiry in the two directions which I have indicated—machinery and soils.

29. "Court of Wards estates have hitherto been utilized in a desultory and useless way. Ploughs, sugar mills, and seed have been sent out to them, but there has been no intelligent supervision available to see that they were properly and persistently tried, and the alarming drought has also interfered with arrangements projected by Sir George Couper. But the Government has now taken practical steps to place Court of Wards experiments on a better footing. One large estate has been placed under a covenanted civilian, who is required to carry out the programme laid down by Sir John Strachey in the most complete way; and the Board of Revenue have issued instructions for special operations in some other estates in communication with the Agricultural Department.

30. "One of the points still unnoticed is agricultural exhibitions. There is one agricultural meeting which Mr. Willock, the former collector of Bulandshahr, promoted at that place, and which is annually held at the expense of the landholders of the district. It is very successful in bringing the people together and giving them an opportunity of seeing good cattle and produce and discussing improvements. The natives themselves have annually exhibited and receive prizes for good seed, but the good seed has always been taken home again by the exhibitor, and I doubt if any practical result has been obtained. But the establishment of a meeting of the kind, which has become really popular with the natives, and is kept up without any official interference from outside the district, is in itself a very great result indeed, and may prove to be the germ of real improvement on a large scale in the north of India. Measures are being taken to interest the talukdars in the institution of a *bond fide* agricultural exhibition annually at Lucknow."

31. Although many private persons, especially indigo planters, have introduced machinery on their estates and tried to improve the system of agriculture there is nothing to relate in the way of practical

successful results, and the native cultivators have in no case followed their example.*

* See Gorakhpur Report for an account of Mr. Bridgman's estate.

BENGAL.

The first movement towards the improvement of agriculture by means of the establishment of model farms in Bengal was made in 1856, when the propriety of making agricultural instruction a part of the curriculum of the Ooterparah school, and raising the school to the status of a collegiate institution, was brought before the Government of Bengal by Babu Joykissen Mookerjee, the well-known zamindar of Ooterparah. Nothing was done however; but in 1867 the question was revived by him, with a proposal that Government should establish a model farm, in connection with the same institution, for imparting practical instruction in agriculture, and the project was supported by a memorial from Babu Hurry Mohun Mookerjee, an assistant in the Botanical Gardens. The proposal to raise the school to the status of a collegiate institution having been negatived by the Educational Department, the subject was again postponed, and the only step since taken towards teaching agriculture in Bengal was the opening of a chair in the Calcutta Normal School for giving lectures on the subject.

In 1871 the Government of India, in the Agricultural Department, circulated Mr. Secretary Hume's note on agricultural reform and model farms, and the district officers of Bengal and several other gentlemen, European and Native, were asked to report on Mr. Hume's scheme. Many valuable opinions were received by Government in reply to the call, the opening of similar farms on estates under the Court of Wards and on Government estates being discussed at the same time.

These reports were finally submitted to the Government of India (in Mr. Secretary Bernard's letter No. 2076½, dated 31st July 1872), with a proposal to establish, with the aid of the Government of India, the following farms:—

(1.) A set of small irrigational farms in Kuttack, on the plan proposed by the Commissioner of the Orissa Division.

(2.) A model farm of not more than 100 acres in the Midnapur District, on a canal, with small attached ryots' farms under supervision.

(3.) A very moderate sized farm on the Sone Canal, in the Shahabad District, with attached ryots' farms under supervision.

(4.) An experimental Government farm in the Khasi Hills in Shillong.

(5.) Model villages in Khas and Wards estates, at the expense of the estate.

The estimated cost of establishing these farms respectively was as follows:—

No. 1.—Kuttack Farms.

	Rs.
Allowances to canal officer for five years - - - - -	6,000
Thirty 10-acre farms at Rs. 2-8 for rent and water, and Rs. 1-8 for seed and contingencies - - - - -	6,000
Allowance for 50-acre farm at headquarters, at Rs. 5 per acre, for five years - - - - -	1,250
Total - - - - -	13,250

Nos. 2 and 3.—Midnapur and Shahabad Farms.

Two superintendents for five years - - - - -	50,000
Rent at Rs. 10 for three years, and Rs. 5 for two years, on 100 acres - - - - -	4,000

	Rs.
Contingent allowance for stock, fencing, &c., at Rs. 30 per acre - - - - -	3,000
Thirty 10-acre farms as in Kuttack - - - - -	6,000
Total - - - - -	63,000

No. 4.—Shillong, Khasi Hills.

Superintendent as above - - - - -	25,000
Contingent allowance for stock, sheep, &c., at Rs. 1,000 per annum - - - - -	5,000
Other contingencies of farm for first three years, land free - - - - -	1,500
Total - - - - -	31,500

Grand total for the four farms - - - - - 1,07,750

The following is a brief account of the several farms thus established in Bengal:—

Shillong Farm.—After some delay a superintendent for the Shillong Farm was obtained from Lahore, in the person of Mr. Freeman, who was appointed to undertake its charge towards the close of 1873 on a salary of Rs. 300 a month. Mr. Freeman proceeded to Shillong in the beginning of 1874, and a grant of Rs. 1,000 was placed at his disposal for commencing operations on the farm.

For the tree nursery, which it was thought desirable to establish in connection with this farm, a tract of land covering an area of about 1,500 acres was taken up in 1872-73 close to the station, and Scotch fir, silver fir, larch and ash seeds from the Botanical Gardens, Calcutta, were put into the ground, but unfortunately none of them germinated. A supply of Australian seeds was also tried. For the orchard, a plot of ground covering two acres, planted with English fruit trees by Major Pollock, was acquired for Government, containing a number of healthy, thriving trees, such as apples, pears, apricots, peaches, olive, and several of the trees were bearing fruit in 1873. The entire enterprise has now been surrendered to the administration of Assam.

Midnapore Farm.—The proposed farm at Midnapur did not get beyond the stage of correspondence, although a proposal had been submitted in 1872 to start a farm of 300 bighas in mouzah Radhakisore. The soil was found to be very poor, and the project was abandoned. The opening of a farm on a smaller scale on the Government estate, Cantonment Mehal, at the sudder station of Midnapur, for agricultural operations and the breeding of cattle and poultry, was also proposed and approved in 1872-73, and sanction was accorded to an expenditure of Rs. 2,000 for buildings and the purchase of cattle, &c.; but no one qualified to undertake the charge of the farm could be obtained, and the project had to be abandoned after a small expenditure of Rs. 25.

Shahabad Farm (Arrah).—The farm projected in the Shahabad District was finally opened at Arrah in April 1873, under the superintendence of Mr. Gleeson, a European gardener from Allahabad, previously in charge of the cotton experiments there. Mr. Gleeson was deputed to take charge of the farm, with a view to his combining the experimental cultivation of the poppy seed, with the operations of the model farm.

The area of the farm was about 50 acres, on Government land, close to the railway and the canal. Mr. Gleeson was allowed one cultivator, one chaukidar, and one chupprasse as servants on the farm, the

CHAP. I. QN. 7. general work being performed by hired labour; and the farm was under the general supervision of the superintending engineer, Mr. Levinge, subject to the orders of the Board of Revenue. The total amount expended up to the end of 1874-75 on account of the farm was as follows:—

	Rs.	A.	P.
Initial outlay in buildings, &c.	8,307	0	11
Ditto in purchase of stock	1,028	10	6
Salaries of superintendent and monthly establishment	4,292	4	7
Working expenses—wages of labour	3,641	10	9
Total	17,269	10	9

Experiments were made with Carolina rice, cotton, flax, and opium. The Carolina rice seed failed absolutely; the flax also; all the water available on the farm being required for the poppy. An experiment with Hinghunghat cotton was fairly successful, the two acres of land sown therewith yielding 797 lbs. of uncleaned cotton in spite of the drought. The experiments with poppy were not so varied as could have been wished, and the unusual character of the season deprived them of any real value. The receipts from sale of produce of the farm amounted from the opening to May 1875 to Rs. 722-6-0.

On the 20th March 1875 the Commissioner of the Patna Division reported to Government that the disbursements on account of the Arrah Farm, up to the end of July 1873, exceeded the receipts by Rs. 11,139-1-3, and the Lieutenant-Governor considered it advisable to approve of the Commissioner's recommendation and close the farm. Orders were given to dispose of the lands, buildings, and farm stock, and credit the proceeds of the sale to Government.

Kuttack Farm.—With reference to Kuttack, the project contemplated the establishment of a 50-acre farm at head-quarters, and thirty 10-acre ryotee farms on the canals. The design was somewhat modified in execution. Twenty ryotee farms were started in 1873 by order of Sir George Campbell, under the supervision of the canal authorities: and one of the objects was to institute a comparison between the returns from irrigated and from unirrigated areas. The report for 1873-74 shows that in that year there were 10 farms; but in the year 1874-75 only five were kept up, the ryots apparently showing no readiness to do what was wanted of them, though very liberal terms were offered.

It may safely be concluded from the figures given in the report that a ryot who gets canal water gratis, and has manure and seed supplied to him by Government, will generally get a larger gross crop off his land than the ryot who does not irrigate his fields, and who uses manure very scantily. It was probably anticipated, when the experiments were commenced, that some conclusion not altogether so obvious as this would be arrived at; but there is nothing to justify any inference as to the comparative net profits of the two systems.

Even the difference in the gross yield is scarcely so much as might have been looked for. On farm No. 1 the average yield was 19 maunds per acre: on similar, but unirrigated lands, it was 16 maunds 8 seers. On farm No. 3 it was 20 maunds 13 seers, while 17½ maunds were yielded by unirrigated lands. As, however, the report does not show whether the season was one in which irrigation was of great importance, it is difficult to draw any deduction from these figures. But, on the whole, it would seem probable that the difference between the gross yield on the two classes of land would be swallowed up by the larger expenses of cultivation on the model farms.

The whole cost for 1874-75 was Rs. 436, and the Commissioner asked for permission to spend up to Rs. 1,000 during the following year. But the Lieutenant-Governor was reluctantly compelled to come to the conclusion that the benefit derived from these experiments was not commensurate with the expendi-

ture involved, and directed that the farms should be abandoned and no further outlay incurred.

Balasor Farms.—Forty-four small ryotee farms were opened at Santipore, under the superintendence of the Revd. J. Phillips, an American missionary, who was formerly a farmer in America, subject to the control of the collector of the district. The area cultivated in 1873 was 305 bighas—145 bighas by 15 Hindu, 33 bighas by 6 Sonthal, and 127 bighas by 23 native Christian ryots. The ryots were found intractable, and the experiment was a failure. The cultivation was mainly confined to indigenous paddy, the main object of the experiment being to convince the people of the advantage of freely using the canal water. The small quantity of Carolina rice sown failed to yield a return, and an experimental sowing of oats only was moderately successful. The total expenditure in these small farms was Rs. 1,910, and the receipt from sale of produce was estimated at Rs. 1,824. The ryots took no interest in the matter, and their inveterate prejudices and superstitions contributed largely towards the ill-success of the experiments, and the small farms have accordingly been abandoned. Mr. Phillips himself opened a small farm of three acres, with the services of a mali or gardener on Rs. 7 a month. Two excellent varieties of sweet potatoes were successfully introduced by him, seeds of which were supplied gratis to the agriculturists for cultivation. A grant of Rs. 250 was made to the Revd. Mr. Phillips for the year 1874-75 to carry on his experiments, but as the results did not prove to be of any benefit the Lieutenant-Governor stopped the grant.

Baraset Farm.—About 150 bighas of Government estate land being found available at the sudder station of the Baraset Sub-division, a small farm was opened thereon in May 1873, under the supervision of Mr. Porter, the then sub-divisional officer, who took a great interest in the matter. Sanction was accorded to an outlay of Rs. 800, in addition to a sum of Rs. 133-15, the accumulation of the school garden fund transferred to the farm, and also to a special grant of Rs. 26 a month. One-fifth of the area of the farm, or 30 bighas, was let out for experimental cultivation to ryots for a term of two and a half years, who were to receive half the produce, and be supplied with seed in addition to the land, while they supplied labour, &c. Convict labour was also employed on this farm, and as it had some good grazing ground it was proposed that it should be tried for the improvement of stock. The native superintendent who was engaged turned out to be a mere botanist, and not a practical agriculturist at all, and his services were dispensed with. A cultivator was subsequently employed on Rs. 10 a month, and the operations consisted of experimental sowings of jute, Carolina paddy, flax, Sikhim dry rice, tobacco, oats, and *sorghum saccharatum*. The reports received of the various crops reaped showed anything but satisfactory results, the character of the season having greatly militated against the success of the experiments. The total expenditure on this farm up to the end of the year 1874-75 amounted to Rs. 1,715-4-6, while the receipts were but Rs. 136-6-9.

The reports received from local officers showed clearly the uselessness of continuing this farm under the existing system. The only useful result that was produced was the planting out of some trees, and these, especially the teak and mahogany saplings, are certainly worth looking after. The Lieutenant-Governor ordered the farm to be closed in September 1875, and orders were issued to sell the plough bullocks belonging to the farm. The sub-divisional officer was instructed to see that the trees were taken care of.

Berhampore Farm.—A farm of about 300 bighas of land was projected on the Gorabazar Government estate, close to the sudder station of Berhampore, of which 200 bighas were leased out to ryots, the rest to be managed khas; and Rs. 500 were sanctioned for initial expenses. A proposal to take up the Moti Jhil Garden, belonging to the Nawab Nazim of

Murshidabad, was made, but after consideration abandoned. With the exception of levelling and clearing the jungle at an expenditure of Rs. 35-7-6 only, nothing was done on this farm for want of a person to superintend it.

Dacca Jute Farm.—The establishment of this farm of 80 bighas of land chiefly for the cultivation of jute from varieties of seed, as well as other crops, was sanctioned in February 1873, and a grant of Rs. 1,000 made for initial expenses, with Rs. 3,336 per annum for working the farm. Fifty-four bighas were brought under cultivation during the season, under the superintendence of Mr. Monier, viz., under jute, 48 bighas; under cotton, three bighas; under Carolina paddy, three bighas. The season was very unfavourable, and operations were commenced late. A superintendent was appointed on Rs. 600 a year. The first and third sowings of jute were successful, but the second sowings failed. Cotton and Carolina paddy were to some extent successful. The acclimatized American cotton produced the finest plants the collector had ever seen in the district. The jute also, from seed from Rangpur, was pronounced to be very fine. The total sum expended on the farm for pay of the establishment and hired labour, purchase of implements, plough cattle, manure, and seeds, and the preparation of sheds and feeding the cattle, amounted to Rs. 5,261-4-9; whereas the receipts from sale of produce amounted only to Rs. 1,268-12. The farm was, under the Lieutenant-Governor's orders, closed in March 1875.

Jamulpur Farm (Mymensingh).—Great difficulty was experienced in obtaining land in this district for experimental cultivation, but a farm was at last begun on Government estate "Line Jamalpur," and 200 bighas of land granted rent free to substantial ryots for a period of five years under the following conditions:—The lessees engaged to settle resident ryots on the land; they were to cultivate the lands at their own cost under Government direction, the seed to be supplied them gratis, and the produce to be their own. The total rental of the estate (700 bighas) was Rs. 666, of which Rs. 207-3 were abated on account of the area allowed rent free. The arrangement was sanctioned for one year only. The farm consisted in all of 277 acres, and experiments were made with Carolina paddy, Sea Island cotton, safflower, tobacco, and mustard. The cultivation failed in every instance but that of safflower, and in that case also the crop was lost through the neglect or inexperience of the manufacturers. The lessees then tired of their bargain, and Government, at their request, cancelled the agreement. The total cost of the experiment was Rs. 257-1-3.

Jail and Public Gardens.—In addition to these experiments, some attempts were made upon a smaller scale in the jail and public gardens of the Presidency Division for improving the growth of cotton, &c. An experimental poppy garden was also started at the Mitapur Jail, in the Patna Division, and another on land belonging to the old Digah Jail, under the management of Mr. Scott. None of these experiments gave any satisfactory or tangible results.

Poosah Farm.—The Poosah estate is a Government khas mehal, consists of two blocks of land in the Darbhanga District, one on each side of the Chota Gandak River. The plot on the north of the river containing 3,720 local bighas is held by the Government under a mokararie lease at a fixed rental of Rs. 1,499, and the southern portion, measuring 1,467 bighas, on which the Government Stud Depot was formerly located, is similarly held at a rental of Rs. 2,138. When the Stud Depot was closed the Government of India contemplated the sale of the entire estate; but on the Lieutenant-Governor's representation it was made over to this Government, as the place was described as well adapted for the trial of agricultural experiment. It was determined that the plot on the north of the river should be settled with the ryots for ten years after the necessary measurement and survey, and a model farm was established in 1874 on the southern

plot, under the superintendence of Mr. Paterson, who was specially appointed for the duty on a salary of Rs. 200 a month.

Various experiments have been made on the farm in the cultivation of the ordinary grains of the country, but, generally speaking, without much success. Experience seems to have proved that the farm will not be of service as a means of improving the cultivation of the ordinary country grains, or of diffusing useful agricultural knowledge. The growth of tobacco has also been tried, as it was believed that the cultivation of this staple, under proper management would add to the welfare of the country. Experiments were made on the farm under the supervision of Dr. E. Brown in the manufacture and curing of tobacco on the Manilla process; but the results, though they have furnished some useful knowledge of the subject, have been financially a failure, and the produce of the tobacco is said to be of no value in the European market. This farm has since been leased to a private company for the cultivation of tobacco.

These details show how various experiments have been unsuccessfully made in the cultivation of the ordinary grains of the country, which the people of the country grew much better and more profitably than the managers of the Government model farms. It has been proved by experience that none of the farms were of any service as a means of improving the cultivation of the ordinary country grains, or of diffusing useful agricultural knowledge. The attempt to teach the people to cultivate their lands cheaply and profitably, and to make the best use of the materials which are under the most favourable circumstances ever likely to be available to them failed everywhere. Indeed it is pretty clear that the people know a great deal better how to make the most of the land with such means as could ever be made generally available, to the petty cultivating class, than any of those who have yet attempted to teach them. Any further attempts at experimental farming and instruction of ryots are much to be deprecated.

Improvement of Breed of Cattle.—There is no record of any systematic attempt having been made in Bengal, either by State or by private enterprise, to improve the breed of cattle. Improved breeding indeed is of little use without improved feeding; and as the area of cultivation extends year by year, and that of forest grazing and waste land recedes, the indigenous breeds of cattle tend perhaps rather to deteriorate than to improve.

Mr. William Tayler, when commissioner of Patna, and Captain Johnstone, when in charge of the Keonjhar estate, tried the effect of improved breeding by putting imported bulls to country cows. The result was certainly a superior breed, but the means employed, and the food required to keep up the improvement, are beyond the means of every cultivator in the province.

The ordinary cattle of the country are admirably adapted by nature to its wants, and a sufficient supply of food is all that is required to enable them to do the work required of them and to prevent their deterioration. If larger cattle were successfully bred, they would die of starvation, and would be no more useful even if they lived, than the ordinary cattle of the country.

Agricultural Implements.—As regards ploughs and other agricultural implements, those now in use are what have been in use for generations previous to our occupation of the country. The faculty of invention and improvement is one quite unknown to the stolid conservatism of the Bengal ryot. Probably experience has shown him that the simple implements which he can construct himself with the material growing at his door are all that he requires so long as they perform the work which he wants them to perform. Bengali agricultural implements, as now fashioned, are well adapted to the work to which they are put. A deep furrow in alluvial soil would often sacrifice all the good earth deposited by flood and bring up sand in its place. All attempts to introduce

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Agricultural Exhibitions, Fairs, &c.—Agricultural exhibitions and fairs are held yearly in many parts of Bengal. They are partly religious gatherings, in which amusement plays a very much more leading part than instruction. Prizes are given for cattle and

agricultural produce of all kinds, but the exhibitors are chiefly persons living quite near to the places where the fairs are held, and it cannot be said that any improvements in the modes of, or implements used in, agriculture have resulted from them. As bearing on the question of famine prevention, their results are absolutely nil. There is no exhibition of new tools, implements, and inventions, such as obtains at similar gatherings in Europe.

Deterioration of Soil.—There are no means of ascertaining, as regards this province, whether or not there has been any deterioration of soils. The pressure of the population on the land has compelled the people to take up for cultivation inferior lands which in former times were kept for grazing or jungles which once furnished supplies of firewood. Ample and timely rain seems to be all that Nature demands on ordinary lands as the condition of an abundant rice crop. In bad years the land gets a partial rest, without which it would perhaps rapidly deteriorate, and all conditions of Indian agriculture seem to turn on a compensation balance system which is admirably adapted by Nature to so poor a country. As regards the exhausting effects of irrigation, it is too soon to speak. The Orissa ryots have a popular belief that the continued irrigation and heavy cropping of soils to which nothing is given back in the shape of manure is deleterious, but no actual or scientific experiments have been made to test this belief. The question can perhaps be answered in the upper provinces, where irrigation is not, as in Bengal Proper, still more or less of a novelty.

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Before, and especially after the provincial exhibitions at Nagpur in 1865 and at Jabalpur in 1866, constant attention has been paid to the improvement of agriculture. A Cotton Commissioner was appointed in 1866, and till the abolition of his post in 1871 did good service. The matter of selection of seed has been adequately pressed on the people.

Some progress, but not proportionate to our efforts, has been, I think, secured. I cannot say how far this progress has been the result of our efforts. My only suggestion is that perhaps something might be done to improve the system of storing grain in Damoh, where it is now buried in pits, in a soil in which the water level during the monsoon rises almost flush with the ground and ordinarily damages some part of the grain, which, however, the poorer borrowers are compelled to receive, and, to the detriment of their health, to consume.

There is a Government model farm at Nagpur.

Estates under the management of the Government or of the Court of Wards are generally encumbered, and there is no room for trying experiments. Good management of its finances are primarily to be guaranteed and secured. When a surplus has been secured the administration has insisted on a portion being laid out in permanent improvements of the estate. It may be doubted whether experiments or speculative improvements in agriculture, except under such thoroughly safe supervision as cannot be provided, should be attempted at the expense or risk of the wards.

Cattle breeding, sheep breeding, and horse breeding improvements have been fairly and fully tried by direct efforts of Government, and have met with, at the best, very limited success. For bullocks, we have, considering their requirements, fairly good breeds in Nimar and the Nerbudda Valley, a mixture of the Gujerat and Malwa breeds. The Nagpur trotting bullock for endurance and speed is probably unrivalled. For agricultural purposes we have good

breeding grounds in the Arvi Tahsil of Wardha, in Kamarpani of Chhindwara, and Dongarthal of Nagpur. Chhattisgarh exports to the Bhandara rice field, but buffaloes are largely imported from Bundelkhand through Saugor, Damoh, and Jabalpur to the Eastern Plains.

It is not beyond question whether our "primitive" plough is not after all the best for our requirements and possibilities; at any rate no change has been made, though the people have been shown many sorts of "Walayati" ploughs and their performances.

In carts a great improvement has been rendered possible through the gradual but very marked improvement in our roads. The Madrassi "bandy," which with one pair of bullocks on fair roads will easily convey two-thirds of a ton, is on the high road to entirely supplant the Maharatta cart carrying only from 12 to 15 maunds. This especially applies to the Nagpur and Western Chhattisgarh traffic.

Sugar mills are what they have been from time immemorial. Skilful blacksmiths and carpenters who could repair more complicated machinery in time of need are but very seldom to be found in our villages.

In my answer to question 4 I have compared the working of Persian wheels, mostly used in Hoshangabad and Narsinghpur, with the ordinary method of raising well water.

Iron pumps have been tried, but the difficulty of getting repairs done appears to be at present insuperable.

Every opportunity of a large and business fair is utilised to establish an agricultural show. For instance, the annual fair at Ramtek has one permanent feature, it is an agricultural show for the stock of Seoni, Balaghat, Bhandara, and Nagpur. At Dewalwar, the Wardha, and Nagpur, the people challenge those of Berar to show better animals. Birman, on the Nerbudda, is the show place, at the time of the fair, for the agricultural stock of the Nerbudda Valley and the Saugor, Damoh, and Jabalpur districts.

Similarly, Singaji in Nimar, Ganiari in Bilaspur, Garhakotali in Saugor, Chhapara in Seoni, and Rajim in Raipur rank as important fairs and agricultural shows.

At present it is too early to assign results to these gatherings. A liberal scale of prizes is offered by the district officers, mostly provided from the district funds and provincial grants.

Deterioration of soil.—I offer the following evidence and opinions on this most important subject.

Last year old patels assured me that in Wardha they had never seen such crops within 50 years as were then growing.

Mr. Grant, C.S., the Settlement Officer of Narsinghpur, mentioned Captains Sleeman and Ouseley as authorities on the early condition of the Nerbudda Valley. A co-temporary of these officers, Mr. Wardlaw, of Seoni, wrote in 1831, and showed what the current belief of that day was. He writes:—

"With the view of showing the productiveness of the different description of soils in their several stages of being either fresh or been for some years under cultivation, or have become by long tillage in an exhausted state, I herewith subjoin tables exhibiting the number of returns of the several grains which each soil at different periods is supposed to yield."

NUMBER of Returns of each Description of Rabi Grain.

Soil.	Wheat.	Gram.	Massur.	Teorah.	Batarah.	Alsee.
1st kabar for the first 25 years	10	10	11	11	11	10
For the following 10 do.	7	7	8	10	10	10
Do. 10 do.	5	4	6	9	7	8
When the land becomes exhausted	3	—	4	8	5	—
2nd kabar for the first 25 years	8	8	9	10	10	10
For the following 10 do.	6	4	7	10	6	8
Do. 10 do.	4	—	5	8	4	6
When the land becomes exhausted	2	—	4	7	—	—
3rd kabar for the first 15 years	6	6	7	10	10	10
For the following 10 do.	5	3	6	9	6	8
Do. 10 do.	3	—	3	6	—	5
When the land becomes exhausted	2	—	3	6	—	—
1st murand for the first 20 years	6	6	7	10	10	10
For the next 10 years	4	—	6	8	6	8
When it becomes exhausted	2	—	4	6	—	—
2nd murand for the first 15 years	5	4	6	8	6	8
When it becomes exhausted	3	—	4	6	—	—
3rd murand for the first 5 years	3	3	4	5	5	6
When it becomes completely exhausted and requires a fallow of 3 years to recover.	—	—	—	—	—	—

NUMBER of Returns of each Description of Khareef Grain.

Soil.	Rice.	Urud.	Tur.	Mung.	Til.	Jagnee.	Kodo.	Kutki.	Jowar.
1st barrah for the first 5 years	10	12	50	10	100	20	30	20	100
For the following 2 years	—	—	—	—	—	15	—	15	—
Do. 25 do.	—	—	—	—	—	—	—	—	—
When the land becomes completely exhausted requires a fallow of 4 years to recover.	—	—	—	—	—	—	—	—	—
2nd barrah for the first 2 years	—	—	—	—	100	—	30	20	—
When the land becomes completely exhausted and requires a fallow of 4 years to recover.	—	—	—	—	—	—	—	—	—

NUMBER of Returns of Grain in the Rice Districts of Kuttangi Karoulah.

Soil.	Rice.
Bundwas land for the first 10 years	16
For the next 40 years	12
Do. 25 do.	10
After which the number of returns will continue at	8
Land not bunded for the first 5 years	10
For the next 5 years	8
Do. 2 do.	4
When the land becomes completely exhausted and requires a fallow of 5 years to recover.	—

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NUMBER of Returns of Grain in the Bandwas Lands of Mandla which yield Two Crops in the Year, one of Kharif and one of Rabi.

Soil.	2nd Class of either of the under-mentioned Grains.						
	Rice.	Wheat.	Gram.	Massur.	Teorah.	Batarah.	Alsee.
1st Kabar for 25 years	12	10	12	12	12	12	15
For the next 15 years	10	8	10	10	10	10	12
Do. 15 do.	8	7	8	8	8	8	8
After which the number of returns will continue at	8	5	—	5	7	—	6
There is likewise an inferior kind of bandwas land called <i>sehar</i> for the first 10 years	12	—	—	—	—	—	—
Do. for the next 40 do.	10	—	—	—	—	—	—
Do. and afterwards	8	—	—	—	—	—	—

I understand that Mr. Grant's conclusion regarding Narsinghpur agrees with what has been arrived at in America, where the question has been closely studied. It appears that land freshly broken up from fallows, unless the wear and tear is made good by manure, rapidly falls for a few years, then the rate of retrogression grows slower, till a point is reached below which its productive powers scarcely diminish.

Mr. Chisholm, the Bilaspur Settlement Officer, recorded that,—

"In this district one hears but little of the exhaustion of the soil; year after year rice is produced in the same fields without any change of crop, or even an occasional fallow; and yet the field is apparently uninfluenced. It seems from the statements of experienced cultivators that new land falls to the level of old in four or five years, and that during this interval the extra yield averages from 25 to 30 per cent. There is no further progressive deterioration. Rice is not an exhaustive crop, and the land is generally manured. This may account for the fact that rice is the only crop with which neither rotations nor fallows are practised."

Up the Nerbudda Valley, in the Mandla District:—
"In some parts of the district, where the richest black soil is found and the land is bunded, there never seems to be any thought of the soil being exhausted; year after year two crops are taken off the land, which is only by accident ever allowed to remain fallow even for a season. Such accidents as the present year, 1868–69, gives an instance of when the exceptionally small fall of rain not only damaged the rice crop, but left the ground too hard and dry for the usual second crop to be put in, otherwise these haveli lands in Mandla may be said to have been continually under cultivation since the time of Hirdah Shah, who first induced cultivators to take them up in Sambat, 1716, A.D. 1660, or a period of about 200 years. It is, however, most probable that when the demand for land was small the cultivators took up fresh ground occasionally, leaving their best fields fallow, but no authentic records show this. Now the cultivator appears to be under the impression that the rich kabur soil requires no rest, and is never exhausted by rice or wheat; occasionally a crop of gram or massur is sown by way of a change.

"With the poorer soils it is quite different. The light sandy soil '*sehar*' has to be left fallow about once in every three or four years, unless bunded, and then it requires no rest. The burha soil is completely exhausted in four years, and has to be left from six to eight years before it recovers its original fertility; then the crops raised on it appear to be of a peculiarly exhausting nature, for even black soil deteriorates much under a crop of kodu; and the Gonds never think of any rotation. Land has been so plentiful that as soon as one field began to be exhausted the cultivator took up another. Occasionally the good soil is overrun with the '*kans*' grass, which it is next to impossible to eradicate; it takes from five to seven years to exhaust itself, and the cultivator seldom makes any attempt to destroy it, but leaves his field and goes elsewhere. This '*kans*' grass is so rank

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and its roots descend to such a depth, that to eradicate it completely it would be necessary to dig down to the depth of at least 3 feet, and for this in the present low demand for land there is neither any inducement nor necessity. As an instance of the great fertility of the black soil, the maaftidar of the village of Bokur has pointed out fields which have been cultivated with rice even since the village has been in his family, and his possession dates back 150 years. These fields have been handed down from father to son, and never been known to require any rest or change of crop. The native theory on the subject is much the same as that arrived at by careful analysis, i.e., that the action of the water on the subsoil and strata of trap below keeps up a continual system of disintegration and decomposition which supplies the place of the good qualities or the soil yearly expended in the produce of the crop, for it is only in banded lands that this continued series of double crops can be raised. In wheat lands when the produce begins to fall off, a crop of 'jagnee' is sown, and ploughed up with the soil, but this is only once in every 24 or 25 years."

For Chanda I would remark that the same land is sown with rice year after year without intermission or noticeable deterioration.

"When fresh soil is broken up for rice cultivation the ground can never be got into proper order during the first year, and the yield is less than in the old fields. In the second year the return rises about an eighth above that of the old fields, and increases gradually year by year until the fifth, when it reaches 50 per cent. above the yield of the old fields. It then commences to decline, and in about another five years has subsided to the level of the old fields, and at that level it remains unchanged apparently for ever. Many fields for instance are believed to have been continuously cultivated for the last 150 years and more, yet they are in no way inferior to land reclaimed from the jungle but 15 years ago.

"Land growing dry crops seems also to reach its highest point of fertility in the fifth year of cultivation, but it falls more slowly to the level of the old fields than is the case with rice lands, and a field 20 years old will be more productive than one which has been 50 years under the plough. In what time the deterioration ceases, if indeed it ever does cease, cannot be said; but in practice, when a cultivator sees a field becoming sterile he allows it to be fallow for from two to five years, in the meanwhile pasturing his cattle thereon, and when the land is again sown it is found to give a yield equal to its neighbours. Looking to these facts and to the vast quantity of virgin and fallow land available in almost every village we have no reason to apprehend difficulties from any exhaustion of the soil."

The opinion held by Mr. Elliott, Settlement Officer of Hoshangabad in 1865, is thus given:—

"The local word for a field being exhausted is *rusced*, and in old reports and returns this is a phrase of constant recurrence. There are great numbers of villages against which in the second and third five years settlement books the remark is written, 'Soil good, but quite exhausted'; 'Soil thoroughly worn out.' Yet these same villages and these identical fields have gone on being cultivated from that day to this, with only such fallows as could be allowed by breaking up uncultivated land in place of the field thrown out of cultivation, a resource which has been diminishing every day. In 1830 Major Ouseley wrote of the Sobhapur Taluka as producing only one-third of what the Babai Taluka did, but if this was accurate a very strange revolution must have taken place,—either Sobhapur must have increased in productiveness, though cultivated without intermission, since it now produces as much as or very little less than Babai, or else Babai must have fallen to a third of its former produce, which view appears untenable. Considering these things it would hardly be unreasonable to deny the *rusced* theory altogether; and this for some time I was inclined to do. I believe, however, that there

must be some truth in it, though the form in which it is expressed is much exaggerated, and requires modification. It stands to reason that land, even the black soil of the Nerbudda Valley, must deteriorate if it is cropped year after year without anything being returned to it. There can be no doubt that when this soil is newly broken up (after the first year) the produce is for two or three years greater than it is afterwards. In the Tapti Valley at present the wheat stands breast high in some of the new villages, and the ear is very large and full, and the crop nearly double the average of the Nerbudda Valley, and no doubt when the Nerbudda Valley was first broken up the crops were the same; and as long as half the first class land was uncultivated, and a new field could be broken up for every one thrown into fallow, they are not likely to have deteriorated much. But this was an exceptional time, and when once regular cultivation set in, and the majority of the land came under the plough, a certain amount of deterioration followed. The old rate of produce in the golden age, or 50 years ago, is supposed to have been ten-fold, and judging from the Tapti Valley, which is in the same condition now, I do not conceive it can have been more than twelve-fold. I reckon the average now to be six-fold, and my belief is that it fell very rapidly from twelve-fold to about eight, and then rather slowly to six or seven; that it was at that stage when the land was reported 'very much exhausted' in 1830, and that it has fallen very slightly, if at all, since then. I have formed this opinion from what I have seen of the Tapti villages, which are so modern that their history can be known with certainty, and also from inquiries into the produce of fields newly taken up from fallow, which for a year or two produce a little more than their neighbours, and then fall to the general level. Lighter soils get exhausted sooner; sandy and gravelly fields will often bear only four or five years' cropping with kharif; second class rabi fields will last longer, but must be thrown up at last; but the true black soil, if properly cultivated, will I think go on producing at the rate of six-fold for ever, and will not fall below it. Of course this is a question which can only be thoroughly tested by experiments, and by accurate knowledge of the history of certain fields; and unfortunately Major Ouseley left no records (or at least none can be found) of his many experiments in agriculture. But I believe bad cultivation will mostly be found responsible for faults laid at the door of the soil; and I have never yet seen a field obviously inferior to its neighbour whose inferiority could not on inquiry be traced either to omission of one of the required ploughings, or to unseasonable sowing (the cultivator having been ill or absent at the proper sowing time), or to *kans* having got into the land and not having been eradicated. Manure is of course the natural remedy for exhaustion. The village of Kollomree, near Hoshangabad, was recorded as one of the most 'exhausted' villages in the district 30 years ago. I inquired for and took the most exhausted field in the village, and manured and cultivated it two years running.

"The first year (1864) I raised a crop of four maunds of gram and one a half of barley. The gram was a good crop, eight-fold the seed; but the barley was a failure, and wanted water.

"The second year (1865) which was not on the whole a favourable season, the crop was eight maunds of wheat, or eight-fold; there was only one field on the village equal to it, and that had been taken up from fallow the year before.

"The opinion which I formed from observation and inquiry as to the exhaustion of the soil is supported by Mr. Waldie's analysis and report. He says: 'The soil consists of trap rock in process of disintegration, and the two columns of soluble and insoluble in acid show the progress of decomposition of the rock. The chief peculiarity of the soil will be the constancy and regularity of its supply of mineral constituents to vegetation, from the gradual decomposition of the rock by

the carbonic acid and oxygen of the atmosphere, with water, and the changes of temperature.

"These are the agents, comparatively feeble in their chemical powers, by which nature very slowly produces the same effect which the chemist does so speedily in his laboratory by the most powerful acids and alkalis. Trap rocks and many others besides consist of a congeries of minerals in small crystals which undergo decomposition irregularly, some of these minerals being more easily decomposed than others. They consist mainly of silica, which is a weak acid, combined with various bases, and the process of decomposition separates the silica from the bases. A small portion of both silica and bases is dissolved by water and washed away, but the greater part remains; and the result of the whole may be stated comparatively thus:—

Bases, viz., alumina, oxide of iron, lime, magnesia, potash, and soda	—	12
Carbonic and phosphoric acid in combination	2	—
Silica, partly in combination, partly in mechanical mixture, which had originally been in combination with these bases	10.5	—
Water and a little organic matter	—	12.5
Mineral constituents of the original rock, which have not yet undergone decomposition	—	7.8
		67.7
		100

"The decomposition of about 67 per cent. will be favoured by everything that promotes its exposure to the agencies specified above, such as ploughing and loosening the soil."

"In other words 67 per cent. of the soil is trap rock, simply ground to powder (by the action of ice or of water), but not decomposed, and unable to yield any of its virtues to promote vegetation, except by the slow process of decomposition year by year. Only on 24 per cent. of the soil does the cultivation toll at all, and from this portion our wheat is produced. Not till the whole of the soil is decomposed, and all its resources drawn on by the cultivators, can there begin to be any fear of exhaustion. At present my view is that the annual exhaustion of the 24 per cent. is compensated for by the annual decomposition of the 67 per cent., and thus the vegetative power of the soil is unaltered, and the same crops can be produced year by year. If larger crops are raised the balance will be disturbed; and the object of scientific agriculture must be either to increase the rapidity of decomposition of the 67 per cent. or else to strengthen the 24 per cent. by manures, &c."

Mr. Grant, when Settlement Officer of Narsinghpur, carefully considered this question, and gives his conclusion thus:—

"Admitting then that the present returns average not more than four-fold, and that the returns for perfectly fresh soil are twenty-fold, the extent of deterioration in little more than half a century would seem to furnish a not unnatural cause for alarm. But it is a question whether this alarm has not been exaggerated. Mr. Maloney and Captain Sleeman, who are the only authorities regarding the early condition of the valley, naturally attached great importance to the deterioration of the soil, for it was going on, and that rapidly, before their very eyes. All subsequent writers on the affairs of the district seem to have followed blindly in their footsteps, and it is almost a *reductio ad absurdum*, of an undoubtedly true theory to find one of the district officers writing in or about 1830 that the returns had then sunk in places to two or three-fold, and that ruin was hanging over the cultivating classes.

"The re-assuring feature in the otherwise disquieting decline of fertility in the soil is that the deterioration has not been gradually progressive, but that commencing with a very considerable impetus it has now

become almost stationary. It will have been seen from the figures given above that while 20 years cultivation reduced the returns from twenty-fold to six or seven-fold, it has taken nearly double that time (from 1828 to 1866) to reduce them from five-fold to four-fold, and the present rate of diminution is so minute as to be imperceptible. Therefore for all practical purposes it may be assumed that the rates of produce will remain constant at the present point, even if improved modes of cultivation are not introduced in the course of the present settlement."

The Settlement Officer of Jubbulpore remarks that,—

"Continued cropping tends to exhaust tagur lands in the Haveli Perganna; they are then styled 'narung' and must be allowed to rest for a year or two every five or ten years, otherwise 'kans' grass (*saccharum spontaneum*) makes its appearance, which takes several years to die out. In the hilly tracts the soil is generally poor, but the population being scanty and land abundant it is more profitable for the cultivator to shift the cultivation in every two or three years than to incur the trouble and expense of manuring and irrigating his fields."

Captain Thomson wrote thus of Seoni,—

"With regard to deterioration by continued cropping which has been so much discussed, I have also heard complaints, but it is chiefly in the lighter kind of soil the moorund, that it seems to be much felt, and, as shown by Mr. Grant, it does not increase or is only progressive in a very slow rate, and with irrigation and manuring it would disappear. But so much of the land of the district is new that the complaint is not so general as in older districts, such as Narsinghpur and Hoshangabad."

In Damoh natives say that the appearance of kans grass betokens exhaustion. Probably it shows bad farming, want of weeding, want of ploughing, want of rotation, want of manure, and does not arise from more than the temporary exhaustion of some of the necessary salts of the earth which have to be replenished naturally by rest or by change of the cultivated crop or artificially by manure.

It is well known that one plant especially takes up the salts of potash, or of soda, or of lime, or affects the nitrates or phosphates more than another; each plant in short has its special chemical food, and to cultivate the same land in consecutive years by plants which have the same favourite food must tend to exhaust; while by varying the plants so as, in the second year, to bring into requisition another set of salts, gives just as much rest as a fallow would give. When from neglect of these considerations, and as he will not manure, the native finds his crops decrease yearly, he gets more careless about weeding, and will not thoroughly plough his ground, but merely scratch the surface.

Under such circumstances, when the breeze wafts a ripe seed of kans grass on to the neglected field, it finds a home. But where the cultivator has done justice to his field and is hopeful as to its productive powers for future years, he is ever ready to root out his enemy, as soon as it shows its appearance. Kans will grow as luxuriously and quickly on the richest black soil as on the poorest black soil, therefore I think it is a sign of neglect and of bad farming, not of deterioration or even temporary exhaustion of this soil.

The following remarks were made by the Settlement Officer of Saugor and of Damoh regarding this noxious grass:—

"To the south of perganna Shahgurbh irrigation does not appear necessary, the soil being generally of a better quality, still the cultivation is solvenly, and there are no signs of enterprise. Here again the kans grass (*saccharum spontaneum*) is the great enemy of the cultivator. It springs up where the ground is in any degree exhausted or neglected, left fallow, or indifferently tilled, even for a year. It sends down its roots to an amazing depth, and forms a complete reticulation of roots throughout the entire extent of land covered by it; so that to subdue it

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when once fairly established becomes a most difficult matter; and as its properties are exceedingly exhausting and heating, the cultivator has no resource but to throw his land out of cultivation until a period of 12 or even 15 years, when the weed dies out of itself.

"I have no doubt but that with deep ploughing and good powerful bullocks the noxious weed could be rooted out; but with the primitive plough now in use here, which simply scratches the upper surface of the soil, it is utterly impossible to do so.

"The soils of Etwa are in general of good quality, except in the villages near the Bina, where they are of inferior quality in comparison with the more inland villages. The lands that have been long under tillage are said to be much exhausted, and much of the fallow is covered with kans grass.

"The local names of soils are the same as in other parts of the district, and have already been described.

"I would here for the last time refer to that serious impediment to cultivation kans grass (*saccharum spontaneum*) the appearance of which always threatened the rich land of this tract, and must never be lost sight of in calculating its future capabilities. I have written fully on the subject in that part of my report which refers to pergunna Jaysinghnagar."

Damoh.—The only effectual remedy for the eradication of the kans grass is embanking the fields and holding the rain water until the middle of October, by

which means its roots, which run very deep into the soil, are destroyed. Deep ploughing with the description of plough in use will not effectually destroy the roots, and there is no remedy but to allow the land to remain fallow from 10 to 15 years, after which the grass dies away. It grows so much faster and stronger than any other crop which can be sown that nothing will grow in a field overrun with kans. The people are quite aware that embanking fields is the only effectual method of overcoming their great enemy, but heretofore they have been too poor or too apathetic under a crushing assessment to take any measures for remedying the evil. Let us hope, however, that during the currency of the present settlement much may be done in this respect. Signs of prosperity are already observable in the district, as within one year of the new assessment nearly 10,000 acres of fresh land have been brought under tillage, and if this improvement steadily goes on, and the life rent-free tenures fall in, it is not too much to expect that the district will easily bear a demand of three lacs of rupees at the next revision of settlement.

QUESTION.—Does any such question (as to deterioration of the soil) specially arise in case of irrigated land?

Apparently no such question arises. Reh is unknown.

BERAR.

BERAR.

Mr. Dunlop.

A cotton department was formed in the end of 1866, and up to the time of its abolition in 1874 the improvement of agriculture, and the development of trade, which has a direct and very powerful influence on agriculture, received much attention.

Two model farms were established, one in the Akola and one in the Amraoti District, and in these agricultural experiments were conducted with more or less success. But the farms, although useful in so far as they showed us the capability of the soil and climate, did certainly not fulfil the object with which they were established, viz., to be a means of diffusing knowledge among the agricultural population. Very few agriculturists, beyond those whose services were engaged on the farms took any interest in them, and the annual expenditure being very high, the Amraoti Farm was closed in 1873 and the Akola Farm in 1874; there is now no model farm in the province.

Suggestions for Improvements.—Some suggestions will be found in the extracts above referred to. I would add to these that, in my opinion, there is great room for agricultural improvement in Berar. While the Cotton Commissioner (afterwards the Commissioner of Cotton and Commerce with the Government of India) was connected with the province our attention was constantly directed to subjects of this nature, but since 1874, so far as it is within my power to judge, matters seem to have been left very much as they were, and little or no practical interest has been evinced in agricultural matters.

Since that date the North-West Provinces have been given a Director of Agriculture, and in Madras the services of the Superintendent of the Government farm at Sydapet have been utilised generally over the presidency, but in Berar we have been stationary.

As the least that should be done in a province where the State possesses all proprietary rights on the soil, I would recommend that a limited sum be set aside annually for experiments at tahsil towns. Money judiciously expended in this way will be likely to have much more effect than a large sum laid out on a model farm which is accessible to only a few people. In these experiments I would continually keep before the people the advantage of—

- 1 deep ploughing;
- 2 manuring;
- 3 selection of seed; and any other points

that may from time to time come under notice, always, however, having regard to economy, and to what the people themselves are likely to be able to afford, and may reasonably be expected to adopt.

For instance, to give but one example, if a number of experiments with bone manure were made in different talukas the people would not be long in making use of all the bones which are thrown away as useless.

But whatever is done in this direction must be done systematically. Results must be properly recorded and published, and above all Tahsildars, through whose agency the operations would necessarily have to be conducted, must be taught to take an active and intelligent interest in agricultural matters.

Some years ago we had a Government bull at Akola, but it was not made much use of. I have not heard of any other attempt to improve the breed of cattle. I think more might be done in this direction. The Berar cattle, although small, are strong and very useful animals, but no proper system of breeding is observed by the people.

Khamgaon was at one time well known for its breed of bullocks, but animals of the description formerly obtainable are now very limited in number, and difficult to procure. A Government stallion is kept in the Buldana District. He served 45 mares in 1875-76 and 36 in 1876-77.

There has been no change in the ploughs or agricultural implements. English ploughs were introduced on our farms, and one or two were taken by native cultivators, but they did not continue to work them.

A decided improvement is noticeable within the last 10 years in carts. The small native *katchar* is being gradually displaced by a larger cart with broad tire wheels.

Many carts on the pattern of the Madras bandy are now plying in the province, and the number of these may be expected to increase as our road system is developed.

Double mōts for lifting water, workable by one animal, have been recently erected at certain populous centres in the Ellichpur District, on patterns obtained from Coimbatore. The Deputy Commissioner does not know if they have, up to date, been copied by any agriculturists.

An agricultural and industrial exhibition was held in Akola in 1868, at which, in addition to many

miscellaneous articles of English manufacture, the produce of Berar and agricultural implements and machinery, both English and native, were displayed.

I have been unable to obtain a copy of the report on that exhibition. It no doubt effected some good by bringing people together, and by drawing attention to agricultural and manufacturing pursuits. At the same time, I have never observed any direct good results from it.

The bulk of the European agricultural implements* and machinery in the exhibition were unsuited for the requirements or resources of the native agriculturists. We took them afterwards to the Government farm, but could not make much use of them. The native agriculturists took little or no interest in them.

In 1871 the Resident sanctioned an annual cattle show and agricultural exhibition to be held alternately at Akola and Amraoti. I was deputed to arrange for the first of these, but owing to the failure of the monsoon in that year the scheme had to be abandoned, and it has not since been revived.

I think it is to be regretted that we do not do more in this way with a view to encouraging careful agriculture and the better breeding of cattle. The system is carried out with considerable success, and at only a small expenditure, at Myjee in Khandesh. The then Commissioner of West Berar (Mr. Lyall) sent me to Myjee in 1870 to observe the system adopted in that exhibition, and it was a similar exhibition and cattle show that it was proposed to inaugurate in 1871 at Akola.

I have not myself observed deterioration of the soil, and attribute this to the system of rotation observed by the farmers, which checks to a very

* Ploughs, winnowing, and corn-grinding machines, &c.

I am not sanguine regarding the effects of model farms and exhibitions under the present circumstances of Berar. The mistake is constantly made of regarding these things as the levers by which agriculture is to be raised; whereas they are merely useful in guiding and possibly accelerating movements which other and infinitely greater causes have originated. With our sparse population high farming is not to be expected, and farms and exhibitions are almost useless. They will only become useful when the people are compelled by large economic causes to work harder than they do, and to endeavour to get more out of the soil than they do. Even in matters in which teaching might seem likely to be of use the people appear to require that more effective teaching which the produce market supplies. I was once in charge of a branch of the cotton department in the Wardah District, and the conclusion

great extent such deterioration, and makes it so gradual that it is not easily perceived.

Fields in the neighbourhood of Khamgaon which I had under observation 10 years ago, have in 1878 apparently as good crops as they produced in 1868.

I quote the following opinions on this point:—

Major Elphinstone in the Settlement Report of the Darwar Taluka, Wun District.—"Evidence of the gradual exhaustion of the land is to be seen everywhere, and before many years elapse the subject of husbanding and even creating manure will have to be taken seriously into consideration. Many materials for the production of artificial manures, such as bones, alkalies, and various minerals, could be easily collected, and it will be interesting to watch the progress our model farms will be able to make in this respect."

Major Szczepanski, Wun.—"No deterioration in the soil has yet been observed, and when the rainfall is sufficient and seasonable the crops are full and good."

Lieut.-Colonel Menzies, Amraoti.—"There has been no observable deterioration in crops. The soil is fertile, and it will stand about 12 years constant cultivation. Being left fallow for a couple of years* then restores fertility. Manuring goes on to a very limited extent."

Major Mackenzie, Ellichpur.—"I have not observed deterioration, but my opinion is worth nothing. I have not gone into the matter, and if I wished to, reliable data of the past is quite wanting, and without such no inquiry could be of value.

"The popular belief is that there has been deterioration, but I don't know that it is grounded on anything reliable."

* NOTE.—I doubt if it is a common custom in the Amraoti District to let exhausted land lie fallow for two years.

I come to on looking back is that my own small experiments apart, I did not succeed in getting an acre more cotton grown, or in bringing a single bale to market in a better condition than it would otherwise have come. The first cotton merchant who offered in the market some fraction of an anna more a pound for clean than for dirty cotton did more for Wardah cotton than I, with all the resources of Government at my disposal, ever accomplished.

Experimental farms may no doubt be useful even now, and there is ample scope for useful labour in the collection of agricultural statistics, and the like. But I am convinced that we shall only repeat old blunders if we embark on new schemes for establishing farms and exhibitions with the idea that they or any such petty causes will produce the results which we are anxious to effect.

BOMBAY.

Mr. Jones.

BOMBAY.

Mr. Peile.

For an account of the three Government farms in Sindh, Khandesh, and Dharwar, see Administration Report, p. 170.

The collectors say,—

Mr. Porteous, Kaira.—There is no model farm in the district, nor have any estates under the management of Government been used for the object of making experiments or setting examples of improved agriculture. Desultory attempts have been made to improve the country rice and tobacco, but the ryots find a ready sale for the common sorts they are in the habit of growing, and will not change them merely with the hope of prospective advantage.

No improvements have been made in the breed of cattle; the breed as it stands is a very good one.

In April 1875 a case of English ploughs was obtained from Messrs. Ransoms, Sims, and Head, of Ipswich, on the requisition of Mr. Ashburner, then

commissioner of the division. These ploughs were made over to the Blow Saheb of Nariad, Mr. Narisram Vajiram, and Mr. Walji Bechar, all men of position in the district, and all owning and personally superintending the cultivation of considerable estates. They all reported that the ploughs were too heavy for one pair of bullocks, that it was found in practice difficult to drive the bullocks and at the same time to devote two hands to the plough, and that therefore the services of two men were required for each plough. I cannot but think these ploughs did not receive a fair trial. The difficulty of guiding the bullocks and of still finding two hands for the plough is one which might have been got over in a few days training; this is a question of training and nothing else.

If the ploughs were too heavy for the ordinary country cattle, they must, I fear, have been of a peculiarly heavy construction.

CHAP. I. QN. 7.
BOMBAY.
Mr. Peile.

At Mr. Harman's Model Farm in Bangalore I have seen ordinary Mysore bullocks, certainly not superior to our ordinary breed of cattle here, dragging an English plough with ease through what struck me as heavy soil to work. Ordinary natives were driving these ploughs, and they did so with no difficulty. I saw a boy of 15, at what I was told was I think his fourth or fifth attempt, driving his plough and managing his bullocks as if he had never done anything else.

In 1876 three Egyptian ploughs were provided by the Commissioner here, and of these two were sold to the Bhow Sahel and Mr. Nursiram Vajiram, but they turned out to be quite as unpopular as the English ploughs previously supplied.

In the beginning of this year a model of the double mhoite was received from the Government farm, Sydapet, Madras, but though it was shown to several well-to-do cultivators, and its principle personally explained to them by the Collector, no attempt, as far as I can learn, has been made by any of them to make practical trial of the novelty.

There is some movement now in the district, in which I understand Mr. Sheppard is taking much personal interest, towards establishing some agricultural schools or agricultural classes in schools already existing. Three boys from the Nariad High School were sent in January last to Sydapet to undergo a course of agricultural training there, and their progress is reported to be satisfactory.

Generally speaking, however, the cultivators of the district are so intensely conservative, that a very considerable amount of official pressure would be required to secure their ever giving a trial to anything new.

I have not observed that there has been any deterioration of the soil, or that crops are worse than they used to be within my own experience. My reason for this reply is that after 11 years continuous work in India, and by far the greater part of that time as a revenue officer in immediate charge of talukas, I have never seen any such alleged deterioration made out on evidence that would for a moment stand in a court of justice.

Mr. Probst, Khandesh.—Agricultural experiments of all kinds have been from time to time carried on in Khandesh, formerly as a rule by Government officers in different parts of the collectorate, but for the past few years more particularly on the Government farm at Bhadgaon. Most of the improved kinds of European implements have been imported and constantly worked on the farm, but they are not much appreciated by the cultivators, partly on account of the peculiar habits and defective strength of the latter, but more particularly owing to the enormous expense of the implements, it being found that handwork can be performed at a quarter the expense.

Many new trees and plants of economic importance have been introduced and widely distributed.

A stud of bulls of improved breeds has been working in the district for years, and although a certain amount of improvement is observable, it is meagre in the extreme, considering the expense involved in its accomplishment.

Ploughs of all descriptions have been introduced, and several constructed on the farm, but the native plough is found to be the most generally useful.

The Khandesh cart is a skilfully constructed vehicle and well adapted to the present wants of the people. No improvement is required.

A variety of iron sugar mills of improved patterns, the property of Government, are annually worked in the collectorate. Cultivators readily hire, but do not purchase them, as although they possess decided advantages over the ordinary wooden mill, these are not sufficient to compensate for the original extraordinary outlay.

Bucket lifts, chain and centrifugal pumps and other complicated appliances for lifting water have been perseveringly subjected to experiment, the indigenous mhoite however, on account of its simplicity and the ease with which it can be repaired, in my opinion beats all other contrivances in point of cheapness.

An agricultural exhibition has been held annually at Maheji in the Pechora Taluka of this district since 1866. Prizes have been freely given for the best specimens of agricultural produce of all kinds; we cannot say that no good results have been obtained, but no general improvement is observable.

Various kinds of European agricultural implements belonging to the model farm, &c. above described are annually exhibited in the Maheji Exhibition, and the cultivators generally are much interested in the working of these, but the price of the machines and the difficulty experienced in repairing them, if even slightly injured, totally prevent their adoption by the ordinary native agriculturist.

I consider that if the rainfall be favourable the soil in general yields crops equal to those of former years.

Unless irrigated land be constantly restored by means of manure deterioration will invariably result.

The replies are based on personal observation.

Kaladgi.—Exotic cotton seed was introduced by Government in 1866-68 with good results. There is no model farm. The breed of cattle is good and does not need improving. The soil is not said to have deteriorated nor the crops to be worse.

Ratnagiri.—There have been many attempts to improve agriculture, both by Government and private persons, with varied success.

Mauritius sugar-cane has been introduced, and has nearly displaced the old red cane.

Carolina rice has been tried, but it is found that the country rice crops of the better lands are equal to the produce of the Carolina seed. The Southern Konkani has nothing to learn from us or America in rice culture.

A new hemp is now being tried; but its success is doubtful.

About 30 years ago an old collector of Ratnagiri, Mr. A. Elphinstone, spent a small fortune in trying to improve the indigenous (or Bourbon) variety of cotton, and to grow it in this district. He produced excellent cotton, but at a fabulous cost.

The same gentleman made attempts to improve the breed of milch cattle. So did I. We both had some small success.

Mr. Robertson, Commissioner, Central Division, says:—Nothing has been done by private individuals to improve agriculture, and next to nothing by Government. On the contrary, this most important and pressing duty has been most grossly neglected by Government. The only successful introduction of seed was that of the American cotton into Dharwar. Occasionally some small and next to useless attempt is made to introduce some exotic seed, but the whole experiment is made in such a weak and penurious manner, that no favourable result can possibly be expected. In the course of my service I have seen one or two model or experimental farms. There was one under me in Dharwar. There was a superintendent on 400l. per annum. He had only about 75 acres of land. Government would not go to the expense of purchasing more. He had no house, no farm buildings, and was obliged to live four miles from his farm. He was a conscientious man, and urged he could look after ten times the land, that by having a larger charge, he could farm at a far less average cost. He felt much that he could not live on his farm, look after his cattle, collect manure, &c., and arrange to make his farm pay in many small ways. He was for three years unfortunate in his seasons. He cultivated several experimental crops, raised a good deal of good Dharwar American cotton, selecting plants for seed. His pay was not charged against the farm, but still the farm did not pay its way. Though the deficit was trifling the farm was closed because it did not pay. Can an experimental farm pay? The name alone proves it cannot. Each experiment with any new seed or staple may be, and often is, a dead failure. One good success is, in the interest of the country, worth a great many failures. Deep soil ploughing may be good, but it costs much. When

tried one year in some land it was a failure, therefore a loss. Another year in other land it was a marked success. So on it ever will be with a model experimental farm. We want to teach the natives, but have first to learn all they know, prove it, and try to improve upon it. Each improvement secured is a permanent gain worth any reasonable expenditure on a model farm.

As regards cattle and horses, nothing whatever has been done to improve the breed of cattle; a little to improve the breed of horses by two or three Government stallions being kept in each collectorate. The progress under this system is really so slow as not to be appreciable.

The fact is the people have no good bulls, no good rams, no good horse or donkey stallions. Whenever an animal is ready for the male it finds a mate anywhere in the fields—perhaps the bull or stallion thus used may be a perfectly useless brute; the result is that both horses and cattle are everywhere in the Deccan very poor indeed.

It would be well if in each taluka of a collectorate three or four good bulls were kept, a very small fee being charged for their services.

I hold that there never can be any real and permanent improvement in cattle or horses till we go to the root of the evil, and take steps to stop the keeping of useless bulls and stallions.

I advocate a tax on all whole animals, exempting from the tax all whole animals which have been passed by a Government veterinary surgeon as fit for breeding purposes. This could only be introduced gradually. The first year the tax would be put on all one-year old. The second on all one and two-years old. The third year on all one, two, and three-years old. The fourth year on all one, two, three and four-years old, and the fifth year on all one, two, three, four, and five-years old, and so on till it was general.

Native cultivators will not make experiments, but when they see a thing a proved success they will, if they can, adopt it. Take for instance the collectorate of Dharwar, where, through the exertions of the collector, Mr. Shaw, American cotton was, after years of hard work, successfully introduced. The ryots saw it was better than the country cotton, and now there are upwards of 350,000 acres yearly planted with it. The acclimatized Dharwar-American has been found to succeed in Khandesh, where Mr. Ashburner had successfully introduced the Hinganghat cotton, and being the best cotton, its cultivation is extending very rapidly in Khandesh.

I cannot say I have observed any deterioration of the soil, though natives everywhere assert it has deteriorated.

It must on this point be remembered that the revenue survey has been so successful that cultivation has extended greatly, and that the area under cultivation is in some places more than double what it was previous to the survey. In old days only the land near the villages were cultivated; now most outlying lands are taken up for cultivation. Consequently there are no fallows. Land is overworked, and not being manured must deteriorate somewhat. Formerly there was so much good waste land that when a cultivator thought his land was somewhat exhausted he gave it up, and took up a new plot which was comparatively virgin soil, not having been cultivated for a long term of years.

As regards the effects irrigation has on land I can say nothing. The natives hold that continually growing irrigated crops on land wears it out.

Colonel W. C. Anderson.—In the Dharwar Collectorate about 40 years ago Government attempted to introduce New Orleans cotton, but till about 1847 with little success, though a considerable amount of pressure was used. About that year all pressure was removed, the area fell off at once from about 20,000 acres to one-fourth of that area; those ryots who had found it answer continued cultivating it to advantage, others followed their example, and the cultivation of this cotton soon rapidly extended, and in a few years

exceeded that of native cotton, the whole area annually under cotton in the collectorate being now rather over than under five lakhs of acres. The New Orleans cotton has been a great source of wealth to the people of Dharwar; the produce of clean cotton per acre is a full one-fourth more than that of native cotton, and the price per lb. always rules higher than that of the indigenous cotton by perhaps 10 to 20 per cent. Attempts were made to introduce New Orleans cotton into other collectorates, but with little success. It requires a moister climate apparently than exists, except in Dharwar. It has also extended from Dharwar into the contiguous north of Mysore. An obstacle to its spread here is the want of facilities for the repair of ginning machinery, as the fibre can only be separated from the seed by such, and not by the native methods, foot-rolling, &c. In Dharwar Government provided shops for the repair of gins, to which the Mysore people resorted, or brought their cotton in seed into the Dharwar districts and sold it there.

I am aware of no agricultural exhibition in the south of the presidency, and of no improved implements having been introduced except the saw gin. The ordinary native implements of agriculture I believe to be fairly efficient if properly used, but though slow to change their ways the people will do so, generally, readily if they see that benefit will result and changes are not pressed on them, in which case distrust arises.

I have certainly not observed any general deterioration in the soil; on the contrary, crops are generally better now than formerly, from more careful cultivation, though there is still room for great improvement in this respect.

It is commonly believed that continuous irrigation deteriorates black soil and renders it too cohesive. The quantity of manure in the shape of village sweepings applied for a succession of years tends to correct this quality, this manure, besides vegetable matter, containing a good deal of earth of a less cohesive tendency than black soil. A cessation of artificial irrigation, and exposure to rain alone, for a year or two, is believed to remedy the cohesiveness. Facts as observed on soil under my own eye tend to confirm this.

Mr. Erskine, Commissioner, Northern Division.—A few attempts have been made to improve agriculture, but on so small a scale that they are hardly worth alluding to. Government have supplied English ploughs of different patterns for trial in the Ahmedabad and Kaira districts; but these have, as a rule, been found too heavy, and were not taken to by the cultivators. In the Ahmedabad districts, some slight desire for Howard's small plough has been manifested, especially in the Christian village near Shahwadi, in the Daskrohi Taluka, where, owing to the example and encouragement given by the missionary, the plough has been a good deal used and with very satisfactory results; and there can, I think, be very little doubt that, especially in seasons of deficient rainfall, the out-turn of grain would be largely increased by the use of a better plough which ploughed deeper than the native one ordinarily used.

Some attempts have been made, but only by individuals, to improve the breed of cattle. Government has, however, attempted to improve the breed of horses by locating good stallions of English and Arab blood in various localities, and have succeeded fairly well; but much remains to be done before any marked effect can be expected. I may observe that the cattle, especially draught bullocks, of the greater part of Guzerat are remarkably fine, and scarcely require much to be done to improve them. It is where there are large areas of waste lands as in the Panch Mahals that the cattle are worst. In these localities, immense numbers of cattle are collected at the breeding season in the forests and grazing lands, and no care is exercised to select suitable bulls to cover valuable cows; all is left to chance, and the result is the majority of the animals are absolutely worthless.

CHAP. I. QN.
BOMBAY.
Mr. Peile.

CHAP. I. QN. 7.

MADRAS.

Board of
Revenue.

This question was one of those referred by Government to the Superintendent of Government Farms, and, with reference to a great part of it, it is unnecessary for the Board to go over the same ground. They will merely remark, with regard to the first portion of the question, that attempts have every now and again been made by Government in all the directions referred to, but that with the exception of the naturalization of Mauritius sugar-cane, nothing can be definitely pointed to as a lasting result either of agricultural exhibitions or of experiments in the way of introducing new staples or improved implements. Details will be found in the Collector's reports. Those reported from Salem form a good specimen of the endeavours which have been made from time to time by district officers who took an interest in the subject. No estates under the management of Government or of the Court of Wards have been used for the object of making agricultural experiments. The improvement of cultivation and the diffusion of agricultural knowledge is now being carried on in a more systematic form in connection with the Government farms and the School of Agriculture, the operations of which will, it is hoped, be considerably developed at an early date. The ordinary cultivator has never been known to show any willingness to imitate or adopt any improvements exhibited to him. To a certain extent this must in fairness be attributed to the fact that his means and the accidents of his surroundings will often not permit of his doing so, but there is also no doubt that he is both conservative and suspicious in agricultural matters as in everything else, and it is with the rising, rather than the existing, generation that any decided advance can be looked for. The successful introduction of Mauritius sugar-cane, however, is sufficient to prove that even the conservatism and prejudice of the ryot will give way to a clear demonstration of the practical advantages to be gained by the adoption of the novelty recommended to him.

No collector has reported that there has been deterioration of the soil within his own experience, but some are satisfied from the inquiries they have made that deterioration is going on. In some localities there is a strong popular belief to this effect, and in such cases there is no want of unhesitating allegation. The following extract from the report of the head assistant of Bellary will show the lengths the ryots are prepared to go when contrasting the present with the past: "The fact, however, remains that old and intelligent ryots state positively that lands which used to produce 20 tooms of grain some 30 or 40 years ago without much manure now only produce 10 tooms however highly manured." The Board need hardly say that they attach no importance to mere assertions of this kind, however positive or however old and intelligent the ryots may be. There is no reason to doubt that for many hundreds of years the methods of cultivation and the implements used have remained unchanged throughout Southern India, in which case, except as regards newly cultivated lands, the question of deterioration within the observation of living witnesses is mainly a question of whether manuring is less carefully attended to than formerly. It is generally admitted that high farming

MADRAS.

has never been the rule in India, except as regards garden cultivation, and there can be no doubt that a great portion of the old (especially unirrigated) cultivated land of the presidency has for a long period been in an exhausted state, far below that stage in which a noticeable deterioration can be observed from year to year, except as a result of less careful cultivation. In several districts this fact appears to have been recognised and the deterioration believed in by the ryots is ascribed to the clearing of forest bringing about a decrease in the quantity of vegetable manure available, while the dearth of firewood resulting from the same cause has led to a greater consumption of cowdung as fuel. Here a rational ground is assigned for the popular belief, but at the same time the fact must not be lost sight of that even now the ryots in very many cases do not make the most of the manure still available, and it is by no means certain that they made a proportionately better use of their opportunities in days gone by. The only collector who reports his own experience on the subject, Mr. J. F. Price, of Chingleput, states as follows with regard to the district of Salem: "A good deal of land of very bad quality was within my knowledge, by means of treatment with manures and being well turned up, brought to bear finer crops than when I first saw it."

From Kurnool it is reported that the ryots attribute the deterioration to the absence of manure resulting from a larger extent of cultivation without a proportionate increase in the number of cattle. Here again there is a plausible reason assigned and one which may operate in fact for the next few years owing to the recent great mortality of cattle, but it is to be observed that the quinquennial statements prior to the famine tell a different tale, thus:—

	1861-62.	1871-72.	Per-centage of Increase.
Acres cultivated	1,060,205	1,143,592	7.7
Tilling cattle	130,418	178,507	36.9
Cows	51,098	58,050	13.6
She buffaloes	70,610	83,333	17.9
Sheep	151,863	224,199	47.6

The Board do not place much reliance on the entries in the quinquennial statement as regards live stock other than tilling cattle, but they probably do not err in the way of exaggeration.

In paragraph 92 of his memorandum addressed to Mr. Ballard, the Acting Superintendent of Government Farms remarks: "It is also known that the area annually relinquished increased during the 15 years ending July 1872 by about 75 per cent., showing that the lands under cultivation cannot now so long support the racking system of cropping pursued by the ryots." In separate proceedings the Board have pointed out to Mr. Benson that the figures on which his calculations are based do not distinguish between *bona fide* relinquishments and transfers of different kinds, and but little support is given to his view by the figures given below, which relate to *bona fide* relinquishments only. Earlier figures are not available:—

Year.	Ryotwari Holdings.	Cultivation.	Waste (Fallow).	Relinquished.	Per-centage of Waste to Holding.	Per-centage of Relinquished to Holding.
	Acres.	Acres.	Acres.	Acres.		
1865-66	18,243,639	16,046,009	2,197,630		12.04	—
1866-67	18,514,593	16,488,203	2,026,390	876,388	10.9	4.83
1867-68	19,005,610	16,935,060	2,070,550	571,463	10.8	3.08
1868-69	19,212,865	17,160,525	2,052,340	652,447	10.7	3.43
1869-70	19,612,378	17,563,501	2,048,877	657,281	10.4	3.42
1870-71	19,987,687	17,927,960	2,059,727	623,784	10.3	3.18
1871-72	19,685,938	17,615,529	2,070,409	1,008,738	10.5	5.04
1872-73	19,742,748	17,943,058	1,799,690	764,430	9.1	3.88
1873-74	19,632,436	17,328,509	2,303,927	821,997	11.7	4.16
1874-75	19,958,014	17,746,237	2,211,777	556,648	11.1	2.83
1875-76	20,021,386	17,462,111	2,559,275	649,206	12.7	3.25

From the above statement it is clear that there is no tendency to an increase in the proportion borne by relinquishments to holdings.

The question of deterioration does not specially arise in this presidency with regard to irrigated land. On the contrary visible deterioration is apparent chiefly in connection with unirrigated land newly taken up, and not unfrequently relinquished again after some years in favour of another fresh field, or one that has had some years rest. Some years ago a special investigation was found necessary in consequence of the

numerous complaints of a saline efflorescence on lands newly brought under irrigation under the Kistna anicut, but it was found to arise from causes irrespective of irrigation, and yielded readily to treatment. Other collectors allude to similar temporary deterioration elsewhere, but the ryots know how to deal with it.

Since writing the above, the Board have seen Mr. Randall's report, submitted direct to Mr. Ballard, and would commend it to the special consideration of the Commission.

MYSORE.

MYSORE.

Mr. Rick.

Mr. Ricketts.—We have had cattle shows, but on no regular fixed principle. The show par excellence would appear to be that of Adunkay, in the Nellore District. It is not a spasmodic show, but has been systematically carried on for years, and even I believe pedigree books kept up, and the result has been splendid—calves which at four months old were nearly half the size of their mothers. This Nellore Cattle Show has conclusively shown the highly improving results obtained by putting good bulls to even poor and ill-bred cows. Where there is much grazing land there will be found numerous poor cattle. Where the keep of cattle is more expensive, then self-interest teaches the ryot that it hardly costs more to keep a good than a poor beast. I have myself witnessed an illustration of this in a certain taluk in the Hyderabad country, where there was literally no waste land and the cattle were virtually stall-fed, consequently the cost of keep was considerable, and the result was that all the cattle were of excellent breed.

Mr. Harman.—Breeds of cattle.—Prizes were given formerly at a fair near Nundidroog, but the fair has ceased.

No attempts have been made at improving the milking qualities of the cattle, nor any to check degeneracy.

Thus, the improvements most required on dry lands are,—

1. Deeper cultivation.
2. The better conservation and preservation of manure.
3. The utilization of waste substances.
4. The growth of fodder crops.
5. The preservation of grazing grounds.
6. The growth of fuel trees.

The improvements most required on wet lands, are,—

- (a.) Tank irrigated land, 7, the cultivation of crops requiring less water than paddy.
8. Increased growth of pulse crops for green manuring.
9. The substitution of dry for wet preliminary operations.

RAJPUTANA.

RAJPUTANA.

Capt. Barr.

Jodhpur and Jesalmir.—No attempts have been made by the Government of the states of Marwar and Jeysulmere to improve agriculture, with the exception of the extension of bunds and other means for storing water. The Maharajah of Jodhpore interests himself largely in these measures, and has built with successful results several masonry bunds and water conduits in the neighbourhood of his capital. The implements used in agriculture by the cultivators of the country are of the rudest sort, but the soil is easy to work, and the cattle employed for agricultural purposes are particularly strong and active. The Persian wheel is in ordinary use for irrigation from wells; the channels for carrying water from the wells, &c., to the fields to

be irrigated are cleverly made, and I notice that in this respect the cultivators of Marwar are in no sense behind their neighbours in the best cultivated opium districts of Malwa, where, during a period of eight years I had many opportunities of witnessing the labour and skill expended on the growth and preparation of Malwa opium; in fact I am of opinion that the care bestowed in the use of water and the mode of its application to the crop is greater in Marwar; no doubt the reason for this is to be found in the fact that water is so much more valuable in this country. The chief wealth of Marwar and Jeysulmere consists in the herds of cattle, horses, sheep, and camels which are bred throughout the country. I am

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not aware of any improvements that have taken place in the breed of these animals, but they have certainly attained a fair standard, as their value is admitted throughout India.

Colonel Brooke estimated the number of horned cattle in Marwar at 2,250,000 head in 1868-69, and though one of the results of that year's famine is to be found in the diminished number of cattle, it is believed that at least 2,000,000 are still fed yearly in the plains of Marwar. Camels and horses, as well as sheep and cattle, find a ready sale at the fairs of Pushkur, Tilwarra, and Purbutsur.

Major Poulett.—Kotah.—During the time that the famous minister Zalim Singh was in power a great deal was done in Kotah to develop agri-horticulture. That period extended over 60 years, ending about 1824. His marvellous powers of organization enabled him to farm with his own cattle 300,000 acres, and, as already mentioned, he speculated on an enormous scale in grain (see Tod's *Annals of Haraoth*, chapter VIII). He brought large tracts under cultivation, introduced a superior plough, attempted to bring into use powerful

foreign cattle, imported foreign fruit trees, and improved indigenous ones. But since his time not only has nothing been done, but there is little trace of the improvements he introduced; though the evil he did in establishing an oppressive revenue system exists in full vitality.

His deep cutting ploughs are no longer seen; his superior manufactures cease to exist, and his fruit trees are no longer remarkable. The large quantity of land which he farmed has been broken up into small holdings, and made over at favourable rents to persons with influence at court, and a great deal of cultivated land has become waste. I hear a good deal of the deterioration of unirrigated land owing to constant tillage. I am told that in 20 years after it is broken up land loses 40 per cent. of its productiveness, but does not deteriorate beyond that point, and can be restored by two or three years' rest. It begins to deteriorate seven years after it has been brought under regular cultivation. However I have not yet been able to go into the subject sufficiently to feel full confidence in the figures given.

Mr. L. Saunders and Mr. White.

Ajmere.—Mr. L. Saunders and Mr. White.—No regular and sustained efforts have ever been made by Government or by private individuals to improve agriculture in any way.

A sugar-cane mill was once brought and used to be exhibited at Pokhar Fair, but as no *gúr* or *rab* is ever made anywhere near Ajmere, no result can be expected. Some Egyptian cotton seed was once sent to the Deputy Commissioner, and was distributed to intelligent zamindars. They did not succeed with it; some straggling plants still exist in the Deputy Commissioner's garden. Guinea grass is grown in the Municipal Gardens in Ajmere, and the town bullocks are fed with it, but the fodder is not popular and no applications are ever received for plants. *Sorghum Saccharatum* had one trial, but showed a most degenerate appearance when it did come up, and has not been tried again. The cattle of the district are undersized and ill-bred, but no serious endeavour has ever been made to improve the state of things.

Colonel Dixon did a good deal to introduce new trees, but I do not think much has been done for agriculture. This is a place where an agricultural college might effect much good if patronised by the Native States. Experiments made here, if successful, and shown to the Mayo College pupils would spread all over Rajputana.

The cattle of the neighbourhood, Marwar (particularly Nagore bullocks, bred only 50 miles away), are famous; the cattle of this country are small doubtless, but the soil is light, and they seem to answer the purpose for which they are required.

Suggestions for such Improvement?

The Court of Wards is generally by far the largest landholder in the province. At present estates with an area of 100,000 acres and an income of rupees 80,000, are under the Court's management, besides five or six other estates managed direct by the Commissioner under the provisions of the *Dami* regulation. These estates are managed just as all the estates of the district

are managed: all the old customs and devices and traditions rigorously observed. No attempt is ever made to improve these estates save by the construction of new tanks, new wells, and so on. No sort of direction of agriculture is ever attempted. There is no reason why this should not be done, provided the fitting person can be procured. An agricultural superintendent drawing his pay rateably from the estates under his supervision, and aided may be by a grant from the district funds. The municipalities of Ajmere and Beawar and the District Committee hold large gardens which are all more or less mismanaged. Such gardens might be placed under the Agricultural Superintendent, who might receive Rs. 450 or Rs. 500 per mensem. But all would depend on the man chosen; he must be extremely good tempered and unwearingly patient. He would be under the administrative direction of the Court of Wards or Commissioner, and would not be allowed to interfere in any way in the management of the estates, save only as an agricultural instructor and inspector. Government has already furnished the district with four high class stallions. The Court of Wards could easily import some good bulls and cows, and could breed horses and fine carriage bullocks were there only some proper person to look after such works. The wealthier *Istimrâdars* are always ready to be convinced by ocular demonstration, although mere preaching has no effect whatever on them; and they would soon imitate all those operations and improvements which were clearly and obviously profitable. They will not risk a penny on what may not turn out to be an improvement after all, but they are only too ready to imitate when success is obvious. They have no enterprize, but they are always ready to follow a lead about which there can be no manner of doubt.

Mr. Saunders writes: I think this proposal is an excellent one if Government would guarantee the salary when the estates in the Court of Wards cannot afford to pay it.

CENTRAL INDIA.

Lieut.-Col. Bannerman.—Baghelkhand.—In my opinion the best thing for Baghelkhand would be an extension of the system of "Bandh Bundi" or embankment of lands for confining the water, which in a hilly and sloping country, as most of the district is, runs to

waste; and secondly, to improve the breed of cattle so as to get more power to plough deeper, which the present stamp of cattle cannot do. * * * No one in Baghelkhand admits deterioration of the soil, but there remains one fact which would appear somewhat to support the

view. It may be assumed that sugar-cane is one of the best and most valuable products of the land, and there are abundant traces throughout Rewah, especially in the remains of sugar mills, &c., &c., to show that in former days it was exclusively grown, but now the cultivation of this crop has almost completely disappeared. The crop requires water, and in the vicinity of the sugar mills there are no signs of irrigation works of any kind, and it must be concluded that the fields were watered from wells, of which at present there are no traces, but which probably in the course of time have fallen. Another possible solution of the disappearance of sugar-cane cultivation, and which appears to me not unreasonable, is that it is not owing to unkindness of nature, but that the improved communication between Oudh and Rewah, and the general quiet of the country, have convinced the Rewah people that it

was cheaper to purchase sugar from the nearest large town than to grow it themselves.

Mir Shahamat Ali, Rutlam.—There is a model farm at Rutlam for making experiments to improve agriculture, where a sugar-cane crushing mill and water lift of English make are introduced, and have been successful. An English iron plough was also hired, but failed to give the desired satisfaction. The financial result is not yet favourable, but in time it is hoped it may succeed. An agricultural exhibition was also held some years, but no good resulted therefrom, and was therefore abandoned. None is held now. No deterioration of the soil is visible. The dry weather and irrigated crops are as good as they used to be centuries ago. No change seems to have taken place.

NOTE on Agricultural Reform in India as proposed and carried out, and the Results thereof.

I have been directed to prepare a précis of the operations conducted by the different agricultural farms started by Government in the several provinces of India: only those operations are to be noticed for which some measure of success is claimed, and it is not necessary to enter into an account of the expenditure involved in the management of the farms.

In order that the précis may be complete, I propose, while confining myself to the instructions, to give first, a brief summary of the scheme of agricultural reform as it was drawn up and carried out; and secondly, to notice the successful experiments, with such general observations as suggested themselves to the officers conducting the operations, and to the Local Governments.

In the beginning of November 1871, i.e., a few months after the Department of Revenue, Agricultural, and Commerce was constituted, the Secretary in that department drew up a scheme in view to improving and developing the agriculture of the country.

The main features of the scheme were as follows: A large Government model farm of not less an extent than 1,000 acres was to be started in every district of the country. The object of the farms would be to grow all existing staples, at first in the most approved local native fashion, then, year by year, on improved and ever-improving systems. The seeds to be sown were to be improved every year by selection, and, where necessary, by interchange with other similar farms. Another object of the farms would be to carry on cattle, sheep, and poultry breeding operations cautiously but perseveringly. A third object was to introduce, acclimatize, and popularize staples and breeds locally unknown. In fine, each farm was to become virtually a practical school of agriculture and a source of supply of improved "material," whether vegetable or animal. All the farms were to have free and direct communication with each other, and liberal prizes were to be offered for the most successful supervisors. Provincial exhibitions were to be held, where numerous prizes were to be awarded for excellence of produce, whether agricultural or animal, and these exhibitions were to be open to the farms as well as to the agricultural population generally. A special agricultural journal was to be started for the record of all the operations, successful and unsuccessful, of the farms, so that everybody might be acquainted with the experiments that were being conducted and the results that were being achieved.

In each division of a province, six districts were to be selected, and in the first instance, six farms were to be started in these six districts. These farms were to be placed under picked Europeans with a certain amount of scientific agricultural training; and they were to be aided by intelligent youths, country born, English, Eurasians, or native.

*As regarded the lands to be provided for the farms, they were not, as a rule, to be rented from private proprietors, but were to be purchased at auction sales of State lands, which sales "take place in many districts and villages," or they were to be waste lands taken up and tenanted by settlers who were to be brought thither to work on them by a system of inland emigration.

The funds were to be provided by the Local Governments, the Government of India advancing half the cost as takavi, and being repaid by the sale price of crops and other products of the farms. The Government of India were to pay the salaries of the men got out, until they became acquainted with the work and the people, or, say for a period of two years each.

The scheme having thus been conceived, the proposals were forwarded to the different Local Governments and administrations for an expression of their views.

The replies, while supporting the proposed scheme, all tended to show that the extent of land (1,000 acres) to be taken for each of the farms was too large, and the majority of the officials consulted were in favour of starting with 200 or 300 acres in each case.

The Government of Madras, who already had a farm at Sydapet in the Chingleput District, which worked well, proposed to start another in the district of Bellary, a third in Coimbatore, a fourth in Tinnevely, and ultimately, if desirable, a fifth one in Salem, Raramaha, or Ganjam. Mr. Robertson, who was the superintendent of the farm at Sydapet, was deputed by the Madras Government to inspect and report upon the localities proposed; and it will be sufficient for our purpose if we note that no new farms were started.

The Chief Commissioner of Mysore advocated the establishment of a farm near the railway station of Malûr in Bangalore. He said that arrangements had been made with the Government of Madras for the deputation of Mr. Robertson of the Sydapet Farm to inspect, with the local officers, the several sites proposed for the establishment of farms in view to the selection of one best suited to the objects in view. A further report was promised. In this report the proposal for starting a farm at Bangalore, in preference to other places, was supported, and it was in accord with Mr. Robertson's recommendation. The Government of India sanctioned the proposal, and Mr. F. E. Harman, a graduate of the Royal Agricultural College of Cirencester, was appointed in charge of the farm.

From Hyderabad the Resident's reply came to the effect that in Berar there were "peculiar facilities" for starting such farms as those contemplated, as

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cotton seed farms existed in the province, and the operations of these farms might be extended to embrace agricultural experiments generally. Two farms were therefore proposed and approved by the Government of India—one in East and one in West Berar. But ultimately, for financial reasons, only one was sanctioned as a tentative measure for a period of five years at Akola.

The Chief Commissioner of the Central Provinces proposed to keep on, in the first instance, the farm which had been started by Mr. Bernard at Nagpore near the Ambajhary Reservoir. Then, when this farm proved a success, another would be started in the Wardha Valley; then a third would be tried at Bhandara, and lastly, a fourth in Chanda. The Government of India sanctioned the proposal for maintaining the Nagpore Farm for a period of five years as an experimental agricultural farm.

In the Bombay Presidency there were experimental farms in Dharwar, in Khandesh, and in Hyderabad; and the Bombay Government said that these farms had then recently been placed under the orders of the collectors of those districts; that reports were awaited to ascertain how the new system worked; and that on receipt of the reports the Government of India would be addressed upon the subject of any improvement that might be necessary.

In the Punjab there already existed a farm in Chandi, and one in Amritsar.

In the North-Western Provinces and Oudh some officers agreed and some disagreed with the proposals of the Government of India, while the Lieutenant-Governor said he was not of opinion that the experiment would be likely to be attended with success. There, however, existed at the time model farms at Cawnpore and Allahabad, and a cotton farm at Buland-

shahr, and Dr. Bonavia proposed starting a farm in Lucknow, which, however was not started.

The Bengal Government proposed, as a beginning, to establish—

- (1.) A set of small irrigation farms in Orissa;
- (2.) A model farm of not more than 100 acres in Midnapore near the canal;
- (3.) A very moderate sized farm on the Soane Canal in Shahabad;
- (4.) An experimental model farm on the Khasi Hills, Shillong; and
- (5.) Model villages in khas and Wards' Estates.

The proposals of the Bengal Government were approved, a money allotment was made for a period of five years, and the Secretary of State was asked to engage the services of competent professors of agriculture.

The Chief Commissioner of British Burma did not approve of the scheme so far as his province was concerned.

Thus experiments were started with the following farms:—

In Madras - - - the Sydapet farm.
In Mysore - - - the Bangalore farm.
In the Berars - - - the Akola farm.
In the Central Provinces - - the Nagpore farm.
In Bombay - - - the Dharwar, Khandesh, and Hyderabad farms.

In the Punjab - - - the Chandi and Amritsar farms.

In the North-Western Provinces and Oudh - - the Cawnpore, Allahabad, and Bulandshahr farms.

and in Bengal the farms mentioned above.

Madras.—I shall now proceed to give an account of any successful experiments conducted by each of these farms, beginning, in the order I have taken, with the farm at Sydapet.

In order that the degree of success achieved in the experiments, which will be noticed, may be fully

appreciated, it seems necessary to give some account of the position of the farm with reference to its soil and climate.

The following statement gives in a condensed form all the information that seems necessary under these heads:—

Situation.	Size.	Elevation.	Temperature.	(a.) Hottest Months. (b.) Coldest Months.	RAINFALL.			Soil.
					Average Annual Fall.	Greatest Average Fall for 10 Years.	Lowest Average Fall for 10 years.	
6 miles south of Madras, near the village of Sydapet.	130 acres for an experimental farm. 115 acres subsequently for a model farm.	25 feet above sea level.	80 degrees mean average.	(a.) May, June, and July. (b.) January	Given as 48 inches; but I find— 57.07 in 1870-71. 52.47 in 1871-72. 86.17 in 1872-73. 48.07 in 1873-74. 68.98 in 1874-75. 38.14 in 1875-76.	9.15 in October. 11.10 in November. 5.62 in December.	1.3 in January. .8 in February. .6 in March.	Very inferior; large proportion of sand, and little fertilizing matter.

The farm of 130 acres was devoted from the outset exclusively to experimental cultivation, and has always been meant to be purely educational. It is bounded on the north by a nullah, on the south and east by the River Adyar, and on the west by the Mount Road. With the exception of five acres which could be irrigated from the River Adyar, and a dozen acres by wells, the whole was dry cultivation.

The farm of 115 acres was to be a model farm, to be worked on commercial principles, and to be educational only by example. It was bounded on the north by a cutcherry compound, west by Mount Road and Roshanbagh Village, south by a commissariat slaughter-house and the nullah separating it from the experimental farm, and on the east by the Adyar River; 20 acres of this farm could be irrigated from Mambalan Tank by gravitation, and 10 acres by wells by means of piccottahs, &c.

The object of both farms was to discover the best rotation of crops, the most suitable manures for various soils, and the most economical system of irrigation;

also to introduce unirrigated root or green crops instead of fallow, new staples, new agricultural implements, and to improve agricultural stock, seed, and native implements.

Mr. Robertson, a scientific and practical agriculturist, was placed in charge of both farms. At first, he encountered considerable difficulties—the difference in the soils and in the capabilities of the plough cattle, the ignorance and apathy of the workmen, the unsuitableness of the implements used, trespasses of cattle; all these disadvantages militated against any useful and correct results being obtained from comparative experiments. But the difficulties gradually disappeared.

The soil being dry and sandy, manure and irrigation were to be the chief agents to be relied upon in conducting agricultural experiments. There, also, some difficulty was met with, for, excepting the five acres mentioned above, which could be watered by gravitation from the Adyar River, the great bulk of the land was situated at a level of at least 20 feet above the

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water-mark. Several kinds of water lifts were tried; first a steam water lift driven by an eight horse-power portable engine, which was abandoned on account of its great cost in working—the cost being from 4.48 pie to 3.45 pie for lifting 10,000 gallons of water 1 foot.

Then an "improved water lift," or single mhote somewhat similar to the first, but worked by bullocks, was tried. This raised 10,000 gallons of water 1 foot high for 3.18 pie. Burgess' and Keys' original water lift was next tried—the lift was at 3.63 pie. By means of piccottahs, lifts were obtained at 4.76 pie, and by Norton's tube pump, with rotary motion, the lift was at 8.40 pie. Roorkee pump gave at 7.60 pie, and a double bucket piccottah gave at 3.33; while a single piccottah gave at 3.73.

At last the double mhote proved to be the most serviceable. I quote Mr. Robertson's account of it as given in his annual report of 1872-73:—

"This is one of the best water lifts that we possess. It was introduced on the experimental farm some time ago." * * "As in some districts the machine may not be known, or, if known, not recognized by the name under which I have noticed it, the following observations regarding its working and construction may be of use:—The water is raised by two leather buckets, similar to those in ordinary use in some parts of this Presidency; to each of these buckets is attached a rope which is fastened to a drum; one of these is coiled and the other uncoiled, as one bucket ascends the other descends; the drum is fixed on a rotating spindle, to which is fixed at right angles the draught bar to which the bullock is attached; the diameter and thickness of the drum varies with the depth of the well: as a general rule, for all ordinary lifts, the diameter of the drum may be equal to about one-fifth the number of feet that the water must be raised; the drum is placed about six feet above the ground, in order to allow the rope to pass over the head of the draught bullock; the spindle upon which the drum is placed is kept in its upright position by means of two beams, into which it is fixed, which cross each other at the middle, and are supported at the ends on posts placed opposite each other on the outside of the bullock patch. The bullock walks under the draught bar attached to a curved yoke, which turns on a swivel. In raising water the bullock travels round the upright spindle, thus turning the drum and winding one rope and unwinding the other. If the diameter of the drum is as suggested, 1½ circuits around the path will raise each bucket to the requisite height; the bullock is turned round, facing the opposite direction, while each bucket is being discharged; no longer time is required to do this than is needed for the bucket to discharge its contents." "The following may be accepted as a fair estimate of the capabilities of the machine as now ascertained:—

Cost per Day.

	Rs.	A.	P.
Hire for one bullock and driver for one day - - -	0	8	0
Interest and wear and tear at 10 per cent. per annum on the capital invested, say Rs. 100, charged over 300 working days - - -	0	0	6
Cost of replacing buckets and ropes three times a year, say Rs. 90, charged over 300 working days - - -	0	4	9
Oil, &c. - - -	0	1	0
	0	14	3

"The cost per day is therefore annas 14, pies 3. When working at the ordinary speed, 90 buckets are raised per hour; each bucket contains 30 gallons when brought to the delivery spout; the height to which the water is raised varies from 20 to 24 feet; thus, 2,700 gallons of water are brought to the surface and discharged in one hour, or 24,300 gallons during an ordinary working day of nine hours, rather more over

an acre of land than a rainfall of one inch. Taking 22 feet as the average height of the lift, it would appear that the machine raises about 27,000 gallons to this height for 1 rupee."*

"This water lift," Mr. Robertson continues "displaced one of the sort very common in this Presidency, sometimes known as the single mhote, that in which, when at work, the cattle must walk down an inclined plane as each bucket comes to the surface, and be backed up again to the mouth of the well as the bucket again descends. This machine, with a pair of cattle, raised only 12,600 gallons of water in a day, while the cattle were exceedingly hard worked in doing this; backing up an incline with a slope of about 45 degrees, about 40 times per hour, is a most effective way of rendering cattle worthless. The cost of working this lift was as follows:—

Cost per Day.

	Rs.	A.	P.
Hire for a pair of bullocks and driver for one day - - -	1	0	0
Interest and wear and tear at 10 per cent. per annum on the capital invested, say Rs. 100, charged over 300 working days - - -	0	0	6
Cost of replacing bucket and rope four times a year, say Rs. 60, charged over 300 working days - - -	0	3	2
Oil, &c. - - -	0	0	4
	1	4	0

The cost, therefore, of raising 12,600 gallons by this lift was Rs. 1-4-0, or only 10,080 gallons for 1 Re., against 27,000 gallons for 1 Re., the cost of doing similar work by the improved machine.

This account was recorded by Mr. Robertson in 1872-73, and the calculations were based upon rates prevailing at Sydapet at the time. Subsequently, i.e., towards the end of November 1875, Mr. Robertson having made a tour in the Coimbatore District, wrote as follows:—

"I was glad to see in the town of Coimbatore eight improved water lifts at work, all of the kind known as the 'Double Mhote'; they were made from a model supplied by the Sydapet Experimental Farm. I learn that there is every prospect that this improved water-lift will be adopted in this district. The experience gained with the lift by the Coimbatore municipality has been of the most satisfactory character; the lift raises, when worked by one bullock, as much water as was formerly raised by two of the ordinary water lifts, each worked by a pair of bullocks."

The following shows the cost at which these "Double Mhotes" were being worked in the Coimbatore District. It will be seen that the total daily cost is even cheaper than what has been shown to have been at Sydapet, thus:—

	Rs.	A.	P.
Hire of bullock - - -	0	4	0
Hire of driver - - -	0	2	0
Hire of water distributor - - -	0	1	6
Interest and wear and tear at 10 per cent. per annum on the capital invested, Rs. 150, charged over 250 working days in the year - - -	0	1	0
Cost of replacing the buckets and ropes three times a year, say Rs. 60, charged over 250 working days in the year - - -	0	2	10
Oil, &c. - - -	0	0	6
	0	11	10

* Or calculating in the same way as for the other lifts, thus, as 22 feet: 1 foot:: 1 rupee: X, we have for answer 8.73 pies as the cost of lifting 27,000 gallons one foot high. Then continuing the calculation, as 27,000: 10,000 gallons:: 8.73 pies: X, we have 3.23 pies as the cost of raising 10,000 gallons of water one foot high.

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"The cost per day for working this machine is therefore, annas 11, pies 10. When working at the ordinary speed, 90 buckets are raised per hour, and as each bucket contains 30 gallons when at the point of delivery, the quantity of water raised per hour is 2,700 gallons, or, in a day of six working hours, the quantity raised is 16,200 gallons. For an expenditure of one rupee, 21,904 gallons of water can be raised to the height of 20 feet by the improved lift, against 11,260 gallons raised for one rupee by the old fashioned lift.

To irrigate an acre of land with the quantity of water generally used, the cost will be, by means of the old fashioned water lift, Rs. 2-1-3 or, by the improved water lift, Rs. 1-1-1.

A crop of ragi, cumboo, or cholam, when grown with the aid of well water, receives from 10 to 12 waterings; the cost then of the irrigation water for an area of one of these crops will be, when the unimproved lift is used, Rs. 22-13-9 or, when the improved lift is used, Rs. 11-11-11; thus showing a saving of about 11 rupees per acre; and the saving will be greater in the case of many other of the crops raised with water from wells, from the greater quantity of water required."

Taking the saving of Rs. 11 per acre, if this saving is really possible, then a district containing 150,000 acres of land irrigated from wells would realize a saving of at least two million of rupees per annum. Besides this direct advantage, Mr. Robertson recounts other indirect but real advantages which the ryots will gain. "Water, manure, more cattle labour," he says, "and more manual labour, are imperatively demanded by 90 per cent. of the cultivated area. "By adopting the new water lift, the ryot will be able to water double the area he was previously able to irrigate; if he prefers not to extend the irrigated area of his holding, he will have cattle

"labour and manual labour set free for collecting and bringing manure to his land, and for the more thorough tillage of his soil, &c., &c."

I said above that the soil of the Sydapet Experimental Farm being sandy and dry, manure and irrigation were to be the chief agents to be relied on in conducting agricultural experiments. I have quoted freely from Mr. Robertson's reports so far as irrigation from wells is concerned, because information was especially required on the working of the "Double Mhote," or improved water lift.

The other means of irrigation which Mr. Robertson took up and made use of, were, irrigation from the Adyar River and the Chembrambankam Tank. Channels were run through the estate; these channels were not built up on embankments to let the water flow, as this caused a waste of water from soakage, but they were dug out about 3 feet below the surface of the water in the source of supply, and the water thus flowed in by gravitation to the portion of the farm on which it was needed, where it was lifted for use. The height of the lift varied in different parts of the channel from 9 to 12 feet. Some difficulty was at first experienced in protecting the banks from cutting during heavy rains, but by planting them with guinea-grass this difficulty was overcome.

We now come to the subject of the manures used in improving the composition of the soils. This subject I would notice, after having given an account of the successful experiments carried out in producing crops, because then it would be sufficient to notice only such of the manures which produced the best results.

The following experiments, picked out from a report dated November 1871, show in a condensed form, the results achieved when the soils were but poor and sandy, and had not had the benefit of the improvements subsequently wrought:—

GRAIN CROPS.

Name of Crops.	When Sown.	Seed Sown per Acre.	Value of Grain per Rupee.	When Harvested.	AVERAGE YIELD PER ACRE.		Remarks.	Average Ordinary Yield per Acre.
					Grain.	Straw.		
Raggi - - - -	April -	Lbs. 25	Lbs. 50	August -	Lbs. 940	Lbs. 4,000	Country grain.	
Chinese sugar-cane -	October -	15	25	January -	1,090	17,000	Seed imported from Australia; valuable crop for loamy soil.	
Chumba paddy - -	" -	20	65	" -	2,200	3,500	Country grain; useful wet crop.	
Carolina " - -	August -	24	—	December	2,500	4,000	Imported from America; valuable wet crop.	
Bangalore maize -	October -	18	40	January -	770	3,500	Useful dry crop for inferior cultivation.	
Queensland " - -	" -	25	30	" -	1,550	5,000	Imported from Australia; very valuable dry crop for high cultivation.	
Red cholam - - -	" -	24	40	February	500	4,000	Country grain; useful dry crop for loamy soil.	
Yellow cholam - -	" -	24	45	" -	800	5,000	Country grain; valuable dry crop for loamy and clay soils.	
Cumboo - - - -	June -	12	45	September	700	7,000	Country grain; useful dry crop for summer sowing on sandy soils.	

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GREEN FODDER CROPS.

Name of Crops.	When Sown.	Seed Sown per Acre.	Value of Grain per Rupee.	When Harvested.	AVERAGE YIELD IN LBS. PER ACRE.		Remarks.	Average Ordinary Yield per Acre.
						Green Fodder.		
Cumboo - - -	January -	Lbs. 12	Lbs. —	August -	15,000 -		Useful fodder crop for hot season for dry cultivation; should be cut before flower appears.	
Yellow cholam, irrigated -	December	24	—	At different times.	50,000 in 5 cuttings.		5 cuttings in 11 months; is a most valuable fodder producer, and farm stock of all sorts eat the fodder readily.	
Yellow cholam, dry cultivation.	June -	24	—	Do. -	17,000 in 3 cuttings.		3 cuttings in 8 months; should be cut for fodder (under either wet or dry cultivation) when about two-thirds grown.	
Chinese sugar-cane -	October -	15	—	December	20,000 -		Seed imported from Australia; is a very valuable fodder producer for loamy soils; is very rich in saccharine matter; and is much relished by stock of all kinds.	

Pulse Seeds.

		Pulse, Lbs. Straw.				Remarks.
Green gram - - -	October -	24	—	February -	480	A country grain; thrives well on calcareous loamy soils; works well in rotation after a cereal crop.
Horse gram - - -	October -	24	—	March -	450 1,800	An indigenous crop; thrives with a very moderate rainfall.

Oil Seeds.

		Seeds.				Remarks.
Gingelly - - - -	June -	8	—	September	800 lbs.	An indigenous crop; thrives with a moderate rainfall.
Castor-oil - - - -	July -	8	—	March -	1,200 "	An indigenous crop; well suited as the first crop for newly reclaimed ground.

No account is given of either the mode of cultivation adopted or the manure used in each case. But the following extract may give an idea of the manural substances generally used:—"Our chief reliance," Mr. Robertson said, "is on our box manure, that is, the manure made in the loose boxes by working and fattening cattle fed on oil cake and green fodder. Besides this, we use a considerable quantity of the ashes of cow-dung and wood, which we obtain in the neighbouring villages and tile yards, the former is rich in phosphates and alkaline salts, and the latter in potash. Mixed in equal parts they form an excellent top dressing for cereal crops. * * *

"We also get a quantity of blood and offal from the slaughter-house, which, when made into a compost with ashes, makes excellent manure. Our auxiliary manures are carbonate of lime, sulphate of lime, saltpetre, bone-dust, animal charcoal, &c. Lime, both from stone and shells, is costly in this district, i.e., Chingleput District."

"I have this year used saltpetre (nitrate of potash) with great success."

The following experiment on Chinese sugar-cane seems to be an instance in point. The total area of the piece of land selected was 3,484 yards. This was divided into 12 equal parts and was cultivated as for cholam: the seed used weighed 10 pounds:—

No. of Plots Sown.	Area of Plots in Square Yards.	Manure Used.	Value of Manure.	YIELD IN LBS.	
				Grain.	Straw.
1	268	13 lbs. of guano	Rs. 1	891	1,045
2	268	152 " of carbonate of lime	1	1,064	1,302
3	268	10 " of saltpetre	1	123	1,410
4	268	Nothing	1	514	849
5	268	37 lbs. of bone dust	1	106	1,285
6	268	112 " of sulphate of lime	1	102	1,280
7	268	13 " of guano	1	91	1,083
8	268	152 " of carbonate of lime	1	931	1,125
9	268	10 " of saltpetre	1	97	1,196
10	268	Nothing	1	654	968
11	268	37 lbs. of bone	1	1104	1,372
12	268	112 " of sulphate of lime	1	914	1,082

AVERAGE RESULTS.

Manure.	YIELD.		INCREASE DUE TO MANURE.	
	Grain.	Straw.	Grain.	Straw.
Unmanured - - -	Lbs. 60	Lbs. 908	—	—
13 lbs. of guano - -	90	1,064	30	156
152 " of carbonate of lime -	99	1,237	39	329
10 " of saltpetre - -	110	1,318	51	410
37 " of bone dust - -	108	1,328	48	420
112 " of sulphate of lime -	96	1,181	36	173

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"The saltpetre, nitrate of potash, an indigenous product, used in this instance, was bought in Madras at the rate of 10 lbs. per rupee. An expenditure of 18 rupees per acre on this manure not only nearly doubled the crop, but after repaying its cost, left an additional farmer's profit of nearly 30 rupees per acre. This salt is best applied as a top dressing when the crop is a few inches above the ground; 100 pounds or at most 150 pounds per acre is enough to apply; it should always be mixed with an equal volume of sand or some similar material, in order that it may be more regularly distributed over the ground. Carbonate of lime (chunam) not only repaid an expenditure of 18 rupees, but gave a profit of nearly 20 rupees. Sulphate of lime (gypsum) not only repaid its original cost, but left an additional profit of nearly 15 rupees per acre. The guano repaid its cost, but only left a profit of about 6 rupees per acre.

The following examples of dry land cropping give an idea of the capabilities of sandy soils, such as those of the Sydapet Farm, when properly treated:—

FIELD No. 18, East side.

Date of Sowing.	Date of Reaping.	Nature of Crop.
3rd August 1869	13th October 1869	Horse gram cut for fodder.
15th October "	6th January 1870	Bangalore maize.
18th January 1870	12th March "	Horse gram cut for fodder.
16th June "	23rd September 1870	Gingelly.
15th October "	3rd February "	Yellow cholom.
3rd March 1871		Tobacco.

This shows that one field bore six crops in 21 months. The following is another example, and shows besides the yield per acre:—

FIELD No. 18, West side.

Date of sowing.	Date of Reaping.	Nature of Crop.	YIELD PER ACRE.	
			Straw.	Grain.
2nd August 1869	13th October 1869	Gram fodder	Lbs. 7,582	—
25th October "	8th February 1870	Queensland maize.	7,543	836
14th June 1870	7th September "	Cumboo	6,000	668
10th October "	25th January 1871	Sorghum	21,000	1,602
8th February 1871	—	Tobacco	—	—
		Total	42,221	3,196

In his annual report for 1870-71, Mr. Robertson recorded the following experiments:—

Names of Crops.	Date of Sowing.	Extent Sown and Seed used.	Date of Reaping.	YIELD IN LBS.		Remarks.
				Grain.	Straw.	
Chumba paddy	October	$\frac{1}{2}$ acre with 9 lbs. seed.	January	409	—	Manured with 12 loads of yercum plants worked into the puddle.
Green gram	"	$\frac{1}{2}$ acre with 9 lbs.	February	375	—	Manured with 10 loads of fold-yard fodder worked into the puddle.
Gingelly	June	$\frac{1}{2}$ acre with 12 lbs.	"	240	—	Market value 18 lbs. per rupee; useful plant in a rotation.
Castor-oil plant	July	4,356 yards with $5\frac{1}{2}$ lbs.	September	762	—	This was the yield up to the 31st March, and the plants were still yielding.
Carolina paddy	September	2,027 yards	December	960	—	Grain produced was very good, and received 1st and 2nd prizes at the Agricultural and Horticultural Society's show in February.
Do.	"	2,650 "	January	1,120	—	Seed produced was very good; return of straw large; crop was tall and closely packed upon the ground.
Red cholom	12th October	28 lbs.	14th February	270	—	Quite a success; seed obtained was good, and was held out for distribution. Besides, a large amount of fodder was produced which was stored up for the dry season.
Yellow cholom	October	"Large area"	"	3,000	—	This was the Richmond variety. Weather being excessively dry, plant ripened prematurely, and yield was thereby greatly lessened.
Australian maize.	5th October	25 lbs.	29th December	1,112 cobs	2,225	This was the Mackey maize. The cobs were larger than any variety till the introduced; grain was large; straw bulk; crop stood 9 or 10 ft high. This is a good variety and well worth general cultivation.
Do.	17th September	25 "	27th January	2,702	—	

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Names of Crops.	Date of Sowing.	Extent Sown and Seed used.	Date of Reaping.	YIELD IN LBS.		Remarks.
				Grain.	Straw.	
Cumboo	June	$2\frac{1}{2}$ acres with 25 lbs. of seed.	6th September	668 per acre	18,000 per acre fodder.	A portion was first cut for fodder, and that produced 18,000 lbs. per acre of fodder. The remainder was allowed to seed, and yielded the 668 lbs. of grain per acre. Cumboo was found a very valuable crop, as it afforded an abundant supply of green fodder during the hot months of June, July, and August. Cattle ate it freely and thrived very satisfactorily upon it.

"Amongst the crops experimented with as fodder producers were—yellow cholom (*holcus sorghum*), Chinese sugar-cane (*sorghum saccharatum*), cumboo (*penicillaria spicata*), horse gram (*dolicus uniflorus*), and common paddy."

The general results of these experiments were summarized thus:

Crops.	Weight per Acre of Green Fodder.	Average Number of Days Required to Produce a Crop.
Yellow cholom (dry)	Lbs. 10,000	Days. 90
Ditto (wet)	12,000	60
Chinese sugar-cane (dry)	20,000	80
Cumboo (dry)	15,000	75
Horse gram (dry)	7,000	70
Paddy (wet)	8,000	65

The experiments having thus advanced, Mr. Robertson noted the effects produced on the soils by the cultivation they had undergone:—

"There is a marked change," he said, "in the appearance of our soils. Soils which, when reclaimed only two years ago, could scarcely rear a blade of grass, and consisted almost entirely of blowing sands, might now, as far as appearance goes, be classed as fair arable soils. Much of this is certainly due to heavy dressings of tank mud and burnt earth; still I think much more is due to deep cultivation and the liberal use of fold-yard manure."

"Our plan has been to apply a slight dressing of manure to each crop, and to crop the land as frequently as possible with green crops. These crops, being cut in the green state, leave a great quantity of roots, &c., in the ground, and add greatly to the quantity of organic matter in the soil. True, we might have effected this more quickly by ploughing in the green crop; but the stock-feeder on land like this has seldom such a superfluity of green food as to justify this procedure."

"Another improvement, which has greatly benefited our land, is the open drains which have been laid out in different directions for carrying off surplus water during the rains. The more I see of dry land farming in this country, the more am I convinced that our crops suffer more from *too much* water than from *too little*. Water in a stagnant condition is more injurious than a drought."

"Deep cultivation with proper manuring has greatly increased the capillary action and absorptive powers of our soil. Crops on this farm continue fresh and green long after the crops on neighbouring farms are scorched and dried."

There was still another improvement which Mr. Robertson introduced, and although an account of it is given in a subsequent report,* I think it might appro-

priately be referred to here; it relates to *sub-soil* drainage in connection with irrigation. Mr. Robertson wrote as follows:—

"Before I had been 12 months in this country, I had become fully convinced that in the districts over which my observations extended, agriculture suffered far more from an excess of water than from a deficiency of water; and the experience I have since had in conducting the operations of the Sydapet farms, and the observations I have made during my tours over the Presidency fully confirm the opinions then formed. I have refrained until now from bringing this forward in a prominent way, from a desire to gain as much information as possible regarding the influence of seasons of various character * * * .

The matter is one which needs to be examined from various stand-points, and one that well deserves our most serious attention. Experiments should be instituted under all the various conditions met with in the cultivation of arable land in this country, and the results should be carefully recorded and compared. I have just begun a small experiment in sub-soil drainage, but it was commenced so recently that I can now do little more than describe the preliminary operations and indicate the direction in which it seeks for information. The field selected for the experiment measures 3.80 acres; it is divided by a water channel nearly in two equal sized portions. The soil is a stiffish loam, of a sour soapy character, resting on a sub-soil of a similar nature, and it has been almost quite unproductive during the five years I have been acquainted with it. The land was formerly (before it became the property of Government) used for growing paddy, under the repeated cultivation of which it has become injured. When heavily seeded, there was generally a fair covering of plant up to the time the crop was about one-third grown, and the plants looked well as long as their roots were confined to the few inches of the healthy surface soil; but after this, when the roots got into the sour soil, there was little further growth, the plants became yellow and stunted, and gradually red from the attacks of the fungoid disease 'rust,' and but an exceedingly small yield of inferior grain was obtained. It mattered not what crop was tried, the result was generally the same. It is intended that one portion of the field shall be drained with stone drains, and the other portion with pipe drains, each portion being separately provided with a main drain and an outfall. On both plots the parallel drains will be $3\frac{1}{2}$ feet deep, and the main drain 4 feet deep, while the distance between each parallel drain will be 24 feet. The cutting of the parallel drain has been let to a contractor at $3\frac{1}{2}$ rupees per 200 running yards; he merely makes the cutting and throws the earth on the sides of the drain."

* That for the year 1872-73.

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I will now go back to the proceedings of 1871-72. In his report for this year, Mr. Robertson gave his conclusions on experiments he had been making for the preceding four years in view to discover whether guinea-grass could be grown without being irrigated. He said his trials proved a complete success, the area of land under this valuable fodder plant had been considerably extended, and the better he became acquainted with the grass the more he valued it. He had very fine crops which had never been irrigated, and some of the best results he obtained in fattening stock were obtained with guinea-grass.

"The fodder can be used for all kinds of stock; it seems to disturb the digestive organs of some animals, but this is only temporary. I have fed cattle and sheep on it *exclusively* for months, not only without ill effects, but with the most satisfactory results. I have found our guinea-grass field a capital place in which to graze our working cattle during the hot season, and for the ewes with young lambs I could scarcely desire a better pasture. It produces such an abundant flow of milk in the ewes, without, what is common in such cases, disturbing the health of either mother or lamb."

Chinese sugar-cane, which had been introduced from Sydney in the early part of 1870, had established itself as one of the regular cold-weather crops. A large quantity of seed had been distributed over the country, and satisfactory results were obtained in most instances. From Bangalore reports were very encouraging, and the crop seemed specially suited to the

more temperate climate of Mysore. The practice adopted in sowing is thus described:—

"The land is first ploughed, scarified, and weeded, and then the manure is broad-casted over its surface. This is then ploughed in, and the land is harrowed along the lines the plough travelled (not across, as the harrow would pull up the manure). It is then rolled, and the seed is sown with the seed drill (the country bamboo drill answers admirably) at distances varying from 12 inches to 18 inches, according to the richness of the soil, at the rate of from 12 to 15 pounds per acre."

Country paddy was tried as a fodder crop. It was cut when the plants were in the short blade, just before the ear appeared. The following were the results of three experiments:—

Grain.	Number of Days between Sowing and Harvesting.	Seed Sown.	Area of Plot.	Weight of Fodder.	Weight of Fodder per Acre.
Car paddy	120	Lbs. 30	Sq. Yds. 1,320	Lbs. 5,348	Lbs. 19,609
Do.	133	25	1,056	4,508	20,662
Do.	135	15	630	2,016	15,488

The cost per acre in producing the results was Rs. 20 in all, and the fodder was therefore produced at 229 lbs. per Re. 1, or at about Rs. 2-6-7 per ton.

The nutritive value of this fodder was tried against ordinary grass supplied by grass-cutters, and the following was the result:—

	Quantity given as forage with 4 lbs. of oil cake.	WEIGHINGS OF THE CATTLE.										Remarks.
		1st.	2nd.	3rd.	4th.	5th.	6th.	7th.	8th.	9th.	10th.	
1 pair of working cattle	Lbs. 30	Lbs. 784	Lbs. 826	Lbs. 836	Lbs. 846	Lbs. 850	Lbs. 860	Lbs. 854	Lbs. 882	Lbs. 876	Lbs. 870	Animal fed on paddy fodder.
	30	870	870	840	835	842	868	852	864	861	859	Animal fed on grass.

Some cotton cultivation was also tried, although the soils were anything but cotton soils. The following table condenses the information given as to the results:—

When Sown and How.	Quantity and Extent Sown.	Produce.	Remarks.
28th October in drills 6 feet apart. It was hoed by manual and bullock labour.	6 lbs. of seed per acre in 5 acres.	1,760 lbs. of seed cotton, or 353 lbs. per acre.	This was in addition to a crop of maize which was sown in alternate rows with the cotton, and was harvested before the cotton had begun to put out its lateral branches.

New Orleans cotton and Australian maize were also tried together, thus:—

When Sown.	Extent Sown.	Produce per Acre.	Remarks.
In September.	5,600 square yards.	189 lbs. clean cotton. 472 lbs. cotton seed. 1,793 lbs. of cobs. 1,013 lbs. of cob stalks, skins, &c. 3,889 lbs. of straw.	Land was well ploughed, then harrowed, rolled, weeded, &c. afterwards ridged at distances of 30 inches apart, and farm-yard manure was applied at 8 tons per acre; maize and cotton were sown along the tops of the ridges in alternate rows. After the crop was a few inches high, a showery morning was selected, and the top dressing was broad-casted over the surface of the drills and hoed in.

The quality of the staple is not reported on, but we will see an account on this subject in a subsequent report.

Meantime we pass on to the next annual report, the one for the year 1872-73, and find that Mr. Robertson, who had apparently set his heart to the production of fodder, recorded in a general way the result of his experiments on this branch of agriculture. He said that a large quantity of fodder had been produced, chiefly cholum and horse gram, and the produce proved large enough to enable the farm to support its own large stock, besides enabling it to sell 80,000 lbs. of fodder during the year to the Commissariat Department for feeding camels, elephants, &c., for which use gram fodder was generally preferred.

The elephant grass (with seeds like the cumboo seed), which seemed to be a large producer and to possess some merits as a fodder, was grown on a plot of land measuring 624 square yards. The following were the results:—

No. of times Ploughed.	Quantity of Manure Used.	Date Sown.	Quantity of Seed Sown.	Date when Germinated.	Number of times Weeded.	Number of Waterings.	Date of First Cutting.	Weight of First Cutting.	Average Height.	Date of Second Cutting.	Weight of Second Cutting.
Ploughed in puddle 3 times.	About 16 cart-loads of fold-yard manure.	14th March 1873.	9 lbs. of seed, broad-cast.	20th March	4 times	25	5th June 1873.	Lbs. 1,576	3 feet	25th September 1873.	Lbs. 1,132

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Then came the cultivation of sugar-cane. A plot of land of about 2,000 square yards had been planted with the cane in February 1872, and the land had been manured with blood manure only, the preparation made on the farm consisting of slaughter-house refuse and village ashes. The cane had been planted out in lines about 3½ feet apart, and there were 35 lines. In November 1872, an average row of canes was cut down; the canes weighed 1,162 lbs. and the toppings 392 lbs., or together 1,554 lbs. This, multiplied by 35 (the number of rows of cane on the plot), would give a total weight of fodder amounting to 54,390 lbs.

In his annual report for 1873-74, Mr. Robertson, after having completed the experiments already summarized, on the cultivation of New Orleans cotton, recorded his conclusive opinion upon the success of this cultivation:—

"My first experiments were made on a small scale; the results afforded were very encouraging. I repeated the experiments again and again, each time on a larger scale, and now cotton is one of the ordinary crops of this farm. The variety I prefer is the New Orleans; it is especially suited for high cultivation, to which it has long been subjected; a dressing of manure that would be necessary to render our inferior soils fit for producing cotton would cause plants of the indigenous variety to run to stem and leaf, instead of increasing the yield; whereas the yield of New Orleans plant, under similar circumstances, would be largely increased. On the experimental farm, crops that have yielded 200 lbs. and upwards of clean cotton per acre have repeatedly been produced, while the average produce in the cotton districts is only 75 lbs. of clean cotton per acre.

Three bales of the cotton produced* were sent to London to be valued and reported upon. Messrs. Walker and Company, of London, reported it to be of a useful description of Salem character, ginned, fair colour, silky, but rather weak staple, and worth about 6½d. per lb. The following were the rates at the time for other varieties of cotton:—

Tinnevely	-	-	6½d. per lb.
Dhollera	-	-	6¼ " "
Western	-	-	6 " "
Cocoonada	-	-	5¾ " "
Bengal	-	-	3¾ " "
Rangoon	-	-	4 " "
American cotton, New Orleans	-	-	8½ " "

But since the date the above-mentioned sample was produced, there was, Mr. Robertson found, "a considerable improvement in the quality of the cotton produced on the farm." It was both longer in the staple, and more soft and silky. The following results show the quantity of clean cotton obtained in 1873-74 from the New Orleans seed cotton:—

Date Ginned.	Seed Cotton Ginned.	Clean Cotton Obtained.	Yield of Clean Cotton per 100 lbs. of Seed Cotton.
August 10th	Lbs. 229	Lbs. 73	Lbs. 31.88
August 23th	409	130	31.78

The average yield of 31.83 lbs. of clean cotton for every 100 lbs. of seed cotton seemed to Mr. Robertson to be very satisfactory, seeing that the best indigenous

* Vide an account of the cultivation on page 12.

cotton did not yield more than 25 lbs. of clean cotton for every 100 lbs. of seed cotton.

The Egyptian cotton plants were tried, but they proved to be a more expensive crop to grow than the New Orleans.

An experiment was tried in raising New Orleans cotton on two plots of land, which received the benefit of sub-soil drainage. Before noticing the result of the experiments I shall quote Mr. Robertson's account of drainage:—

"The field selected for the experiment measured nearly four acres; it is divided in two nearly equal sized parts by an open channel. One of these portions, which I shall refer to as plot (a), measures 8,800 square yards; the other portion, plot (b), measures 8,742 square yards. The whole of the field has been drained in one way, under what is known as the 'gridiron' system. The ordinary drains are 3½ feet deep, and are placed 24 feet apart. Each plot is provided with one main drain which runs along at right angles to the line of the parallel drains, and into which the whole of the water is discharged; the outlet of this drain is formed of brick built in lime with an iron gate over the vent to prevent rats, &c. going up the pipes. The depth of the main drain is four feet. Stone drains have been laid down over the whole of plot (a), while plot (b) has been drained by means of pipe drains."

"As far as can be judged from the short time these drainage experiments have been in operation, I consider that pipes will be far better suited than stones for use in draining in this country. An important advantage attending the use of pipes is that land so drained can, during a drought, readily be sub-soil irrigated by passing the irrigation water into them, sluices being put in the drains at suitable places, to prevent the water passing out. By sub-soil irrigation the water can be far more evenly distributed; no surface ground is required for water channels, and there is less waste by evaporation. By thus combining drainage with irrigation, the agriculturist will be less dependent on the character of the seasons than at present."

I shall now give the details of the cropping of the two plots thus drained.

Plot (a).—Drained by stone drains. The soil, after being thoroughly worked and cleaned, was ridged and 36 cart-loads of blood manure (a compost formed of ashes and the refuse of the slaughter-house) were then spread between the drills. The ridges were next split by the plough, one half falling over the manure on either side, thus forming new ridges with the manure beneath; these ridges were next consolidated by the chain harrows when the land was fit to receive the seed. On the 17th September the seed was sown on the ridges, which were about 30 inches apart. A line of cotton was sown alternately with a line of maize throughout the whole plot. The quantity of seed sown was—

Maize, 8½ pounds.
Cotton, 8½ pounds.

During the growth of the crop the land was ploughed twice and hand-hoed three times. The maize matured and was ready for gathering in the middle of December. The cotton crop was longer in coming into bearing, and as the weather was so exceedingly dry, several months passed over before the whole crop was gathered. The maize yielded 4,147 cobs; and from the cotton plants 299½ lbs. of seed cotton were collected. When dry, four of these

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cobs on the average yielded one pound of clean maize, this would give a total produce of 1,036 lbs. of clean maize; of the seed cotton 100 pounds yielded on the average 31½ pounds of clean cotton, or, say that the total produce was 94·30 lbs. of clean cotton. Besides this, the straw and the cob stalks, skins, &c., were estimated to weigh 2,956 lbs. and 793 lbs. respectively.

Plot (b).—Drained by two-inch pipe drains. The soil was prepared in the same way as the soil of plot (a), and about 10½ tons of blood manure and 54 parabs of lime were applied to the plot. On the 4th September the plot was sown, 11 lbs. of maize and 9 lbs. of cotton seed sufficed for sowing the whole plot in the same way as described in referring to the sowing of plot (a). Two ploughings and four hand-hoings were all the after-cultivations performed. The maize did not mature until the beginning of January; the cotton was not all gathered until several months after. The maize yielded 5,728 cobs, and the cotton yielded 404½ pounds of seed cotton, or clean maize 1,432 lbs., clean cotton 127·41 lbs. The straw, besides, weighed 4,112 lbs., and the cob stalks, skins, &c., weighed 1,104 lbs.

Extent Sown.	Quantity Sown.	Date of Sowing.	Dates of Cutting.	Yield of 1st and 2nd Cuttings.	REMARKS.
744 square yards.	10 lbs. of seed.	2nd Aug.	25th October, when the plants were coming into ear. 18th December	4,575 lbs. of fodder which, when dried and made into hay and cured, weighed 1,411 lbs. 2,673 lbs., which, when dried, yielded 925 lbs. of hay.	Total return thus obtained from the plot during 4 months from date of sowing to date of second cutting was 7,248 lbs. of fodder, which gave 2,336 lbs. of hay = per acre to 47,151 lbs. of fodder or 15,197 lbs. of hay.

The mode of cultivation followed in the above experiment was two ploughings, two harrowings, two weedings, seven waterings, and four cart-loads of fold-yard manure.

In 1874-75 an experiment was made with maize with a view to ascertain whether seed sown out of the usual season (September), and treated as a wet instead of as a dry crop, would give any out-turn. This experiment, if successful, would prove of some importance, as maize from its tall upright growth was especially liable to injury from the effects of high winds which generally prevail during the monsoon, which is the usual time for maize. A plot of land measuring 1,950 square yards was on the 15th January sown with 14½ lbs. of maize seed. The soil was a free sandy loam; it was twice ploughed, twice harrowed, manured with 1,500 lbs. of oil cake, and 14 cart-loads of ashes, and ridged. During the growth of the crop the land was five times irrigated, and once hand-hoed. The plants grew so luxuriantly that it was found necessary to thin out a considerable number; the weight of fodder thus obtained was 1,134 lbs. The remainder of the plants matured three months after sowing and produced 1,738 cobs and 1,324 lbs. of dry straw.

With regard to yellow cholom (sorghum vulgare), Mr. Robertson wrote as follows:—

“I have frequently drawn attention to this valuable fodder crop, and I would again do so, as its value is yet but little appreciated by those who might benefit most largely by cultivating it. Most of the live stock on the Sydapet farms are fed on cholom fodder throughout a greater part of the year; the crop is therefore cultivated on these farms on rather an extensive scale. The following details refer to a crop which was produced on a plot of ground, measuring 2,494 square yards; the soil was a stiffish loam; before being sown it was prepared in the following way:—Once ploughed, once harrowed and ridged, then manured with 10 cart-loads of farm-yard manure, and again ridged over the manure, the ridges thus formed being about 24 inches apart. The seed was sown on these ridges on the 2nd of June; it

Mr. Robertson remarked:—

“Satisfactory as are these results, they do not fully exhibit the benefits in this instance gained by sub-soil draining, for it must be remembered that before the drainage was performed the land was almost hopelessly unproductive, having been rendered so by swamp cultivation. The stoppage in the stone drains in plot (a) during the latter growth of the crop undoubtedly lessened the return that would otherwise have been obtained.

“With further experience I feel sure that pipes will be found much more suited than stones for use in sub-soil draining in this part of India.

“Throughout the long drought which was experienced during the year under review the cotton on the pipe-drained land was always green and fresh, while that growing on the undrained soils was withered and much blighted.”

The next successful experiment we find recorded is the cultivation of shamay (panicum miliare) of tall growth, somewhat resembling the elephant grass. This was cultivated as a fodder crop, and the following table condenses the results:—

germinated well and produced strong and healthy plants. The crop during its growth was hoed by hand twice, and was 16 times irrigated. The crop, three months after sowing, was cut down for use as fodder, when its total weight was found to be 4 tons 10 cwt. and 50 lbs., equal to 8 tons 15 cwt. 59 lbs. per acre, a quantity sufficient to support two ordinary milch cows during a year.

“We have occasionally produced much heavier crops than this; thus the plants growing on 75 square yards of a plot sown with yellow cholom were found to weigh 664 lbs., which is equal to a yield of 19 tons 2 cwt., and 66 pounds per acre. This large yield was obtained only on a portion of the ground, the remainder of the crop not being so good; but the result shows what it is possible to achieve in the production of cholom fodder. This large return was obtained from plants only nine weeks old.”

Guinea-grass, the cultivation of which already proved a success, was again tried this year. A plot of land, measuring 4·77 acres, was, on the 28th November last, planted with the grass; the soil was a sandy loam of rather a stiffer character than the prevailing soils of this farm. After three ploughings, the land was manured with 4,000 lbs. of cotton seed, the vitality of which had been previously destroyed; the soil was then raised in parallel ridges about 9 inches in height and 2 feet apart; and the plants were put in on these ridges at every 2 feet, a wet day being selected for planting. The plants, with which the ground was planted, were removed from tussocks of this grass growing in another field. No irrigation water whatever was applied to the crops, either at the time of planting or subsequently, “and the rainfall “moreover, was unusually light during the three last “months of the experiment.”

The first cutting was obtained in February, and the yield was 3 tons and 56 lbs.; another cutting was obtained in March which weighed 2 tons and 20 lbs.; and there was at the end of the month another crop of about the same weight ready for cutting.

In 1875-76 an experiment was made to test the produce of yellow cholom by means of three modes

of cultivation; 1st, with farm-yard manure; 2nd, with ashes; and 3rd, without any manure. A piece of land measuring 2,427 square yards, which had pre-

viously been ploughed, was divided into three equal-sized plots, and each plot was treated as above. The details of the cultivation were as follows:—

	Plot No. 1.		Plot No. 2.		Plot No. 3.	
General nature of soil	-	-	Sandy loam	-	-	Sandy loam.
Area of land sown	-	-	809 square yards	-	-	809 square yards.
Cultivation of soil before sowing	-	-	Ploughed and ridged	-	-	Ploughed and ridged.
Kind and quantity of manure used	-	-	3,150 lbs. farm-yard manure	-	-	Not manured.
Pounds of seed sown	-	-	20 lbs. of yellow cholom	-	-	20 lbs. of yellow cholom.
Date of sowing	-	-	8th April 1876	-	-	8th April 1876.
Date of appearance of plants above ground.	-	-	13th „ „	-	-	13th „ „
Cultivation during growth of crop	-	-	Hand-hoed	-	-	Hand-hoed.
	Wet Days.	Inches.	Wet Days.	Inches.	Wet Days.	Inches.
Rainfall during growth of crop	25	8·83	25	8·83	25	8·83
Date of first cutting	22nd June 1876.		23rd June 1876.		24th June 1876.	
	Per Plot.	Per Acre.	Per Plot.	Per Acre.	Per Plot.	Per Acre.
Weight of fodder from first cutting	4,058 lbs.	10·826 tons	4,368 lbs.	11·684 tons	3,140 lbs.	8·578 tons
Date of second cutting	23rd August 1876.		23rd August 1876.		23rd August 1876.	
Weight of fodder from second cutting.	1,680 lbs.	4·4825 tons	1,176 lbs.	3·037 tons	896 lbs.	2·197 tons
Weight of fodder from both cuttings.	5,738 „	15·3085 „	5,544 „	14·721 „	4,036 „	10·775 „

The experiments could not be continued further, as the land on which the crops were growing was required to facilitate the carrying out of certain estate improvements.

Experiments were also made with seeds received from Australia; these consisted of Chinese sugar-cane,

planters' friend, maize of three varieties, prairie grass, buffalo grass, &c. Most of these seeds were sown on the experimental farm for producing seed for distribution. Some of the crops raised from them were very good, and a large quantity of excellent seed was obtained, thus:—

Names of Crops.	Nature and Extent of Land Sown.	Manure Used.	Pounds of Seed Sown.	Dates of Sowing and Germination.	Number of Wet Days and Inches of Rainfall.	Date of Harvesting.	WEIGHT OF PRODUCE.		REMARKS.
							Of Grain when fit for Market.	Of Straw when Dried.	
Chinese sugar-cane.	Sandy loam, 6,204 sq. yards.	35 cart-loads of farm-yard manure, and 20 lbs. of guano spread uniformly in the furrows between the ridges.	Lbs. 14	7th Oct. 12th „	27 days, 21·31 inches.	20th Jan. 1876.	1,468 lbs.	11,643 lbs.	Land before sowing twice ploughed, harrowed and ridged, and again ridged by splitting the ridges over the manure. During growth of crop twice hand-hoed.
Planters' friend	Sandy loam, 3,654 sq. y-rds.	24 cart-loads of farm-yard manure.	10	16th Oct. 21st „	22 days, 19·57 inches.	3rd Feb. 1876.	992 „	5,040 „	Same as above, plus once hoed by cattle during growth of crop.
Maize (early American).	Sandy loam, 2·83 acres.	42 loads of farm-yard manure.	18	21st Sept. —	31 days, 24 inches.	20th Dec. 1876.	7,390 cobs	5,824 „	Same as above, but during growth of crop twice hand-hoed.
Maize (yellow flint).	Sandy loam, 1½ acres.	(Not stated)	19	22nd Sept. 25th „	31 days, 24 inches.	5th Jan. 1876.	4,050 „	—	Land before sowing was ploughed, harrowed, and ridged. After growth of crop twice hand-hoed.
Sumba paddy.	A stiff loam, ·58 acres.	6 cart-loads of yerpum and eratom plants.	—	14th Oct. 1875.	—	10th Feb. 1876.	1,200 lbs. or 1,364 lbs. per acre.	—	Land before sowing was ploughed and levelled.
Ditto	A stiff loam, ·52 acres.	6 cart-loads of yerpum and eratom plants.	—	29th Sept. 1875.	—	20th Jan. 1876.	1,127 lbs. or 2,167 lbs. per acre.	2,128 lbs. or 4,692 lbs. per acre.	Land before sowing was ploughed and levelled.
Ditto	A stiff loam, ·52 acres.	2 cart-loads of yerpum and eratom plants.	—	28th Sept. 1875.	—	10th Jan. 1876.	681 lbs. or 1,310 lbs. per acre.	1,568 lbs. or 3,015 lbs. per acre.	Land before sowing was ploughed and levelled.
Ditto	A stiff loam, 1 acre.	8 cart-loads of yerpum and eratom plants.	—	21st Oct. 1875.	—	13th Feb. 1876.	2,000 lbs.	2,352 lbs.	Land before sowing was ploughed and levelled, besides was hoed during growth of crop.

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Names of Crops.	Nature and Extent of Land Sown.	Manure Used.	Pounds of Seed Sown.	Dates of Sowing and Germination.	Number of Wet Days and Inches of Rainfall.	Date of Harvesting.	WEIGHT OF PRODUCE.		REMARKS.
							Of Grain when fit for Market.	Of Straw when Dried.	
Yellow cholom	Sandy loam, 2 acres.	—	Lbs. 60	29th Nov. 1875. 4th Dec. 1875.	7 days, 2'99 inches.	6th Mar. 1876.	1,130 lbs., or 565 lbs. per acre.	—	Land before sowing was ploughed and harrowed, and during growth of crop hoed once.
Ditto	Sandy loam, 62 acres.	6 cart-loads of farm-yard manure.	30	28th Mar. 1876. 31st Mar. 1876.	8 days, 3'87 inches.	10th May to 25th June.	—	Fodder 6,240 lbs., or 10,065 lbs. per acre.	Land before sowing ploughed and harrowed; during growth of crop hoed once.
Ditto	Sandy loam, 2,697 sq. yards.	—	—	—	—	17th Sept. to 16th Nov. 1875.	—	Fodder 7,824 lbs., or 14,041 lbs. per acre.	Land before sowing ploughed and harrowed; during growth of crop hoed once.
Cumboo	Sandy loam, 1'02 acres.	—	—	—	—	17th Sept. to 16th Nov. 1875.	—	6,972 lbs., or 6,835 lbs. per acre.	Land before sowing ploughed and harrowed; during growth of crop hoed once.
Horse-gram	Sandy loam, 5'02 acres.	—	134	24th Dec. 1875. 31st Dec. 1875.	1 day, 1'81 inches.	1st April to 1st May 1876.	—	13,848 lbs., or 2,759 lbs. per acre.	Land before sowing ploughed and harrowed; during growth of crop hoed once and dug.
Ditto	Sandy loam, 1'09 acres.	—	15	6th Aug. 1875. 10th Aug. 1875.	15 days, 11'14 inches.	22nd Sept. to 7th Oct. 1875.	—	3,458 lbs., or 3,172 lbs. per acre.	Land before sowing ploughed and harrowed; during growth of crop hoed once and dug.

This analysis of the experiments conducted in 1875-76 may be closed with an extract regarding the working of the "Double Mhote," of which a detailed account has already been given. Mr. Robertson wrote as follows:—

"This water lift continues to give good results. Several models of it have been sent to different parts of the Presidency. In Coimbatore Municipality, to which a model was sent, I recently saw eight of these water lifts working. Regarding the introduction of these water lifts into the Coimbatore District, the Collector, in a letter to the Secretary to the Board of Revenue, No. 18, of the 10th January 1876, paragraph 6, wrote:—

"That interest has been awakened has been proved to me by numerous ryots having come to Coimbatore to inspect the improved water lift which I had constructed from a model furnished to me by Mr. Robertson, and, by their having evinced the most practical proof of its advantage, by adopting it."

"Other accounts are equally as satisfactory, thus—the Nawab of Muslipatam, in a letter of the 13th of June last, wrote:—

"The model of a double mhote which you kindly gave me is found very useful here. I have constructed

the mhote in my lands here, and its work is going on now. Many of the zemindars of the district are also desirous of introducing the practice of the double mhote, and I hope to see soon its usefulness throughout the district."

The year 1876-77 proved very detrimental to the cultivation of the experimental farm, owing to the drought which prevailed. The necessity of providing food for the large number of cattle and sheep on the farm prevented the carrying out of any extensive experiments on the land where irrigation water was available. However, the crops produced without irrigation water were, in several instances, very satisfactory, especially those sown early.

"The advantages that result from deep culture were very clearly shown in the past year. The most casual observer, in looking over the crops during the drought, could not have failed in noting the remarkable superiority of the plants growing on the deeply tilled soil, compared with those growing on the head-lands of the fields and other shallow cultivated land."

The following table contrasts the results of both systems:—

Rainfall during Growth.	Duration of Growth.	Nature of Cultivation.	Area of Plot.	Yield of Straw.	Yield of Straw per Acre.	Yield of Grain.	Yield of Grain per Acre.
Inch.	87 days	Deep - -	Square Yards. 16,027	Lbs. 11,456	Lbs. 3,459'6	Lbs. 221	Lbs. 66'7
16		Shallow - -	2,180	216	479'5	4'5	9'99

"The whole field had been heavily manured throughout, and, if anything, the head-lands (shallow cultivation) received more than their share of the manure."

It is, however, not said what grain is alluded to. The following table gives the out-turn of four of the several crops grown during season 1876-77, and seems worthy of notice:—

Description of Crop.	Sorghum.	Planters' Friend.	Yellow Cholom.	White Cholom.
Area of plot	8,470 square yards	6,930 square yards	17,632 square yards	18,207 square yards
Date of sowing	17th October 1876	18th October 1876	10th October 1876	8th December 1876
Amount of seed sown	14 lbs.	40 lbs.	75 lbs.	73 lbs.
Seed sown per acre	8'00 "	27'93 "	20'58 "	19'40 "
Date of reaping	24th January 1877	31st January 1877	15th January 1877	3rd March 1877
Duration of growth	100 days	106 days	98 days	87 days

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Description of Crop.	Sorghum.	Planters' Friend.	Yellow Cholom.	White Cholom.
During growth—				
Rainfall	4'75 inches	4'35 inches	4'75 inches	16 inch
Wet days	13	12	13	3
Yield of—				
Straw	8,948 lbs.	5,600 lbs.	10,096 lbs.	11,672 lbs.
Grain	1,615 "	650 "	1,640 "	225½ "
Yield per acre of—				
Straw	5,103 "	3,911 "	2,771 "	3,103 "
Grain	924 "	454 "	450 "	560 "

These results are attributed to the depth of cultivation, the value of which in a droughty season is so appreciable, and also to the manuring which all the fields received. The sorghum was grown on a light sandy loam, which had lain fallow during the previous year and was heavily manured with box manure; the crop was also top dressed with saltpetre; the seed was sown as little as could possibly be used with any good results. The crop of planters' friend was grown on a light soil of average quality, which had been extremely well cultivated; it only received as manure a top dressing of saltpetre. The yellow cholom was grown on a thoroughly cultivated soil, and followed a crop of indigo. The white cholom received only 16 inch of rain; the land was in good condition from deep cultivation and a heavy manuring of horse manure.

Maize.—"A plot measuring 2,418 square yards was sown with this crop, and, under occasional irrigation, it produced, between November 8th and February 6th, 6,108 lbs. of fodder, which is at the rate of 12,226 lbs. per acre. The rainfall during the period of the growth of this crop was 3'90 inches, and it received eight waterings; it was manured with about 12 loads of stable manure, and received a top dressing of 50 lbs. of saltpetre."

Buck Wheat.—"A plot of 1,300 square yards was sown with this crop, the seed having been obtained from Australia. It grew well, and would, in an ordinary season, doubtless attain maturity without being watered; but in the present case it was necessary to do so. The seed was sown on November 9th, and within 10 weeks the crop was off the ground, leaving it ready for another. The yield was at the rate of—grain 167 lbs. and straw 1,136 lbs. per acre; but under more favourable circumstances, it would, there is every reason to believe, yield better results."

I have not noticed the experiments conducted by the Model Farm, because the farm did not quite answer the object for which it was opened; and after a trial of three years it was found advisable to close it and to transfer the land to the experimental farm for stock breeding experiments.

MANURE.

In the foregoing summary I have mentioned in each case the manures which were used in the experiments conducted on the Sydapet Farm. I may now give an account of the manual substances most used on the farm, and the means by which, and cost at which, the substances can be procured.

It has already been seen that *saltpetre*, an indigenous product, gave some good results. The place at which it was purchased was Madras, and the cost was 10 lbs. per rupee; but suitable samples for top dressing can, Mr. Robertson said, be purchased at a much lower price. The Collector of Salem sent him a sample of crude saltpetre from his district which could be procured there at 60 rupees per ton. The following is the analysis of this sample:—

	Per cent.
Moisture	7'90
Sand	4'30
Chlorides	5'40
Pure nitre (nitrate of potash)	82'40
	100'00

I also noticed briefly *the farm-yard manure*. A more detailed account may be given by quoting from one of Mr. Robertson's reports:

"This was made in our cattle-boxes under cover, protected alike from sun and rain. It consists of straw used in bedding, and the excrementitious matters of the cattle, which being allowed to accumulate in the boxes during two or three months, layer by layer, and being constantly subjected to the pressure of the animals' feet, becomes a rich homogeneous mass of a dark brown colour, fitted at once for use, without undergoing any preparatory process."

"We find that in an average year we obtain 20 cart-loads of this manure for *each* working bullock housed in these boxes; and this is only the manure made at night and during the day when the cattle are not engaged in field labour; thus, *for every pair of working cattle we employ we can calculate on obtaining 40 cart-loads per annum* of farm-yard manure, or, as it should more strictly be called, box manure. * * * We now use this manure *direct* from the cattle-boxes; formerly I had it carefully stacked in pits in the different fields in which it would be needed, but I was obliged to give this up, as the manure, in a dry season suffered so much, not perhaps by any diminution in its fertilizing ingredients but in its physical properties, for it must be remembered that the beneficial results attending the use of farm-yard manure are due to no inconsiderable extent to its physical action on the soil, as well as to its power of yielding to the soil the exact chemical food needed for the production of crops. * * *"

Cotton Seed Manure.—"This was simply cotton seed which had been steeped in urine or water to destroy its vitality. It is undoubtedly one of the best manures we possess, and is suited for any crop that will grow, more especially the cotton crop. In cotton seed we have a large quantity of fertilizing matter concentrated in a very little bulk. It is thus well suited for coffee or tea planters, and where in order to reduce the cost of transit, it is necessary to get a *portable concentrated manure*."

Carbonate of Lime.—"We obtain this in the form of burnt shells (marine and fresh water) such as are used for preparing shell chunam in the Madras District. They yield an almost pure carbonate of lime, containing an exceedingly small quantity of impurities. After being slacked it forms a light powder, which can, with great facility be spread over the land."

But the difficulty seemed to lie in the cost of fuel for burning the shells. This difficulty, Mr. Robertson said* would be overcome "in those fortunate districts in which lime abounds, if the present rumour of the discovery of the local formations in one or two districts of this presidency turns out to be correct, as coal can be conveyed long distances by rail at a very low rate."

Bone Dust.—"This is minutely pulverised bones; so prepared in order to facilitate distribution over the surface of the ground. But in order to avoid any adulteration of bone-dust by the dishonest dealer, bones broken to a quarter or half inch size can be procured and used quite as effectively, not perhaps in the immediate result but in the general effect."

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"All the different preparations of bones are valuable to the farmer, whether as boiled bones, crushed bones, bone dust, bone black, or in the form of superphosphate chiefly in yielding phosphate of lime; though in the raw state bones yield a large per-centage of ammonia, still it is as a means of adding phosphate of lime to the soil that they are chiefly employed by the farmer, as it is phosphoric acid and phosphate of lime that all cultivated crops appropriate so largely. * * * Bones are costly in this part of India, but there seems little probability of their becoming cheaper, as their use is becoming much more general, especially amongst the tea and coffee planters on the hills. Our only hope of obtaining phosphatic materials at a fair price * * * is in the discovery of phosphatic rocks, or coprolites, in accessible parts of our own Presidency."

Mr. Robertson has some hope of such rocks being found in the Presidency, and he mentions the fact that small quantities have been discovered in the Trichinopoly Collectorate.

Oil-cake.—"The variety of cake used is known in Mysore (where it is chiefly produced) as 'Ippa' cake, in Madras it is called 'Ippa' cake. The seed from which it is manufactured grows on a small tree, the botanical name of which is *Bassia Longifolia*."

It can be obtained in sufficient quantity in Bangalore, and a small lot of this cake, weighing 3,002 pounds was purchased there for 8 rupees, or at the rate of about 15 maunds for the rupee. Mr. Robertson said that of all the manures he used in 1871-72, the *Bassia* nut cake produced the most satisfactory results. No analysis of this cake had been made, but one made of the cake of the nut of the *Bassia latifolia* by Dr. Voelcker may, it is said, be accepted as indicating pretty closely the general character of the *Bassia* nut cake. The analysis is as follows:—

	Per cent.
Moisture - - - - -	13.54
(a) Organic matter - - - - -	80.79
Phosphate - - - - -	1.43
Magnesia, &c. - - - - -	3.63
Sand - - - - -	.61
	100.00
(a) Containing nitrogen - - - - -	2.73
Equal to ammonia - - - - -	3.31

Castor-oil Cake.—(50,000 lbs.) was used on the Sydapet Farm. It was bought at the moderate price of about 15½ rupees per ton delivered in Madras. The cake was generally used as a top dressing after being first pulverized, and was applied at the rate of 200 pounds per acre. The result was in most instances very satisfactory, and the cake proved much superior as a manure to most of the ordinary manurial oil-cakes. The following is an analysis of castor-oil cake by Dr. Voelcker, and published in one of the journals of the Royal Agricultural Society of England.

	Per cent.
Moisture - - - - -	9.95
(a) Organic matter - - - - -	81.07
Phosphate of lime and magnesia - - - - -	4.49
(b) Alkaline salts - - - - -	1.80
Sand - - - - -	2.69
	100.00
(a) Containing nitrogen - - - - -	8.69
Equal to ammonia - - - - -	10.55
(b) Containing phosphoric acid - - - - -	.06
Equal to tribasic phosphate of lime - - - - -	.13

"It will be noticed that the cake is especially rich in nitrogen; it is, therefore, a powerful fertilizer. Its action is slow; but when mixed with cattle manure it becomes a great deal more active and more fitted to meet the wants of quick growing crops. For coffee and tea plantations a more useful auxiliary manure can scarcely be obtained, and it can, in most parts of the Presidency, be bought at a very moderate price."

Poudrette.—"A large quantity of poudrette was made; it consisted of village ashes and the excrementitious matters collected daily from the village latrines."

Care was taken to have the ashes thrown over the matters.

"After remaining in heaps thus formed, for six or eight months, the manure became thoroughly deodorized and fit for use. In this state the coolies made no objection whatever to work with it; and the character of the manure was so thoroughly changed, that few persons could, from its appearance, determine the nature of its original ingredient."

This poudrette was used with great success on maize, cotton, cholam, &c.; indeed it is fitted for the wants of any of our cultivated crops."

The Fern.—(*Pteris Aquilina*) generally known as the bracken. This is found abundantly in many parts of the higher hill ranges, of the Madras Presidency. It is "used as a litter for cattle stalls, &c., very largely by coffee planters resident on the Neilgherries, in Wynad and in Coorg. For this purpose it is well suited where the straw of cereals is costly and difficult to obtain. * * * When used in cattle-boxes, the fern rots more readily than ordinary byres; it is used chiefly in the large open 'crawls' in which buffaloes and hill cattle are confined at night. * * * These 'crawls' are kept liberally bedded with ferns, grass, &c., which, under the treading of the cattle at night, aided by rain, become broken up and worked into a black-coloured mass. This is a convenient and expeditious way of working up ferns, &c. into a form convenient for manure." * * *

The following is an analysis* of the composition of the ash of the bracken, compared with an average analysis* of wheat straw:—

	Bracken	Wheat Straw.
Per cent. of ash - - -	7.01	4.95
Composition of the Ash.		
Potash - - - - -	42.8	11.5
Soda - - - - -	4.5	2.9
Magnesia - - - - -	7.7	2.6
Lime - - - - -	14.0	6.2
Phosphoric acid - - -	9.7	5.4
Sulphuric acid - - -	5.1	2.9
Silica - - - - -	6.0	68.3
Chlorine - - - - -	10.2	—
Total - - - - -	100.	99.8

"It will be observed, in comparing these analyses, that not only does the fern yield a much larger quantity of ash than wheat straw, but that more than one half of this ash consists of the highly valuable fertilizing minerals, phosphoric acid and potash, both so essential in a soil on which coffee trees are growing."

Cattle Dung Fuel.—Mr. Robertson points out the loss which agriculture suffers from the practice the cultivators have of using cattle dung as fuel. The approximate composition of the urine and of the dung are said to be as follows:—

	Urine.	Dung.
Water - - - - -	920	840
(a) Organic matter, urea, uric acid, &c. - - -	60	135
(b) Inorganic matter, salts of potash, soda, &c. - - -	20	25
Total - - - - -	1,000	1,000
(a) Containing nitrogen capable of yielding ammonia. - - -	9.00	3.60
(b) Containing phosphoric acid - - -	.70	2.25

* By Professor Emil Wolff, of the Royal Academy of Agriculture at Hohenheim, Württemberg.

Mr. Robertson says that it will be seen from this that the urine is a very valuable fertilizing agent, and that the country suffers a serious loss from the urine being allowed to run to waste. Much loss, he says, is also caused by the solid excrements being used as a fuel, for the whole of the organic matter, which constitutes at least 85 per cent. of dry dung, and which contains, amongst other valuable plant food, a large percentage of nitrogen, the most costly and most difficult to replace of all these foods, is dissipated into the air and lost. Nor is any economy secured by using cow-dung for fuel, since the selling price* of a ton of dry dung is, in most instances, in excess of the selling price of firewood, and, at the least, double the price at which firewood could be produced in the neighbourhood of towns, and on the holdings of ryots for their household use.

Mysore.—It has already been said that in the Mysore Province a farm was started at Bangalore, and that Mr. Harman was appointed in charge of it.

The plot selected was of 142 acres and 17 guntas in extent, and contained excellent soil both for wet and dry cultivation, and its proximity to the centre of population made it especially adapted for the objects in view. These objects were (1), the preparation of well trained and instructed young men for the charge of district farms hereafter, and (2) the production of the best grain crops, indigenous and imported, on high farming principles, and the rearing of a few cattle, sheep, and poultry of the best description.

Mr. Harman arrived in March 1875, and before being put in charge of the farm, was placed at the Sydapet Farm at Madras under Mr. Robertson, in order that he might familiarize himself with the system of agriculture followed there. After a training of five months at Sydapet, he took charge of the farm in August 1875.

The only report of his which I have been able to procure is the one for the year 1876-77. There is one other, but as that was the first one, no result of any agricultural experiments is perhaps recorded in it, and it cannot therefore be of much use for our purpose.

The report for the year 1876-77 tells us of the many works of building, implement making, land improvement, and agricultural experiments which were carried out. Omitting the first two, I shall notice only such of the proceedings as will serve our purpose.

Ever since the farm was started (August 1875), seasons of unusual drought had been experienced, but during that time various improvements were effected; roads were made, weeds, which were numerous, were destroyed, and land was levelled and equalized. Besides this, surface drains to a length of 3,000 feet were cut. A large portion of land being low, numerous channels and outlets for water were required, and by their help several acres of fine soil, up to then a useless swamp, were brought under cultivation. Across the main drain a substantial dam was constructed, and sluice gates were provided.

Every well on the farm was cleaned and repaired, and a number of earthen channels were constructed to lead the water over larger areas than were formerly irrigated. The raising of water from wells by the ordinary "yatam" of the country being an expensive operation, steps were taken "to introduce a modification of the double wheel so successful in the Madras Farm."

Topes of mango trees were planted out and cocoanuts were put along the banks of the main drain; besides a nursery, containing seeds of various useful trees, being laid out.

Mr. Harman confessed his ignorance of the system of agriculture followed by the ryots of the Mysore Province, and strongly urged the advisability of being allowed to make short tours through the principal agricultural districts, at varying times of the year, so as to enable him to acquire the practical local experience which he was in need of.

An experiment was made to test the capabilities of the native against the English plough. The ploughing was started and stopped at the same time, and while a native plough went over 749 square yards in 7 hours, an English plough worked up 3,031 square yards; the former attaining a medium depth of three inches, and the latter of four inches.

The following are the results produced by each of the ploughs:—

Kind of Crop.	Area in Decimal of an Acre.	Details of Cultivation.	Produce in Lbs.		Produce per Acre in Lbs.	
			Grain.	Husk.	Grain.	Husk.
Horse gram - - -	.154	Native plough; no previous crop; no manure used; soil light sand; broken up and sown by three turns of the plough.	30	70	194.8	474
Ditto - - -	.220	English plough; no previous crop; no manure used; soil light sand; broken up by a single ploughing, and seed covered by a brush harrow made of bamboo twigs tied together.	49	154	222.7	700

Another experiment was made with both sorts of ploughs for testing the implements as crop producers. The experiment gave miserable returns in both cases, owing to the drought, yet it is sufficient to indicate the superiority of the English implement.

Kind of Crop.	Area of Plots in Decimal of an Acre.	Seed sown in Measures.	Produce in Measures.	Produce per Acre.	Remarks.
Black gram - - -	.197	6	.25	12.19	Native plough; no manure used; soil broken up as thoroughly as possible by several ploughings.
Karamani - - -	.27	4	5.00	18.40	
Green gram - - -	.27	4	6.00	21.70	
Black gram - - -	.4	11	9.25	23.12	English plough; no manure used; soil broken by three ploughings.
Karamani - - -	.5004	8	50.50	22.98	
Green gram - - -	.4	5	36.00	90.00	

* The price, however, is not quoted.

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Various attempts were also made to raise crops of different sorts, but the unfavourable season caused most of the experiments to fail.

Queensland maize was, however, grown with some success, from seed which had been raised on the Sydapet Farm.

The area sown was 415 acres; the land was first rate garden loam; ten waterings were given from a well, chiefly while the plants were young; town manure was used at the rate of 12 loads per acre. In a month the plants were 10 inches high, when a slight top dressing of village manure, about five loads per acre, was given, and the land was thoroughly hoed. The cobs were ready in three months, and were sold by public auction for Rs. 26 at the rate of Rs. 62-10 per acre. The yield was at the rates per acre of, green cobs, 6,291 lbs., and fodder 14,894 lbs. The cobs averaged 261 to the hundred-weight.

Another plot of 52 acres was sown without irrigation. The soil was good garden soil, and the cultivation was the same as that of the above-mentioned plot. Green cobs were sold for Rs. 64-8, or at Rs. 124 per acre. The cobs averaged 125 to the hundred-weight, and the crop gave a total yield at the rate of, green cobs 14,277 lbs., and fodder 10,680 lbs., cut and weighed one week after removal of the crop.

Sorghum Saccharatum, apparently introduced into Mysore in 1870, was largely grown under a variety of conditions during the year:—

"The great weight of green fodder it gives per acre, even during this dry season, has been well brought forward, and the slight trouble incident on its cultivation is a point much in its favour."

"As a catch crop, sown early in the season so as to be removed in time to get in horse gram, it was thoroughly successful. On June 16th, a field of poor land was thrice roughly scratched with the native plough, the seed sown broad-cast, and again ploughed to cover it in. On August 25th it was harvested, and yielded 18,460 lbs. of green fodder per acre. The land was at once ploughed, and sown the next day with horse gram, which gave, on harvesting, 220 lbs. of grain per acre. Nothing was here attempted but what the poorest native might do; no manure was applied, and no irrigation; while only the country implements were employed."

"A second crop sown broad-cast on July 1st, and harvested 8th September, when weighed, gave the following results:—

"Plot (a).—Following an unmanured crop of gram on tolerably good land—24,240 lbs. per acre.

"Plot (b).—Following a crop of maize which had been manured at the rate of 15 loads per acre with town refuse—25,600 lbs. per acre."

Another crop, grown in rows two feet apart, on good garden land and irrigated twice, was left for seed. The soil had been deeply cultivated by hand, and during growth of the plants was three times hoed. On the 31st October the crop was harvested and yielded at the rate of 1,480 lbs. of seed, and 19,120 lbs. of partially dry straw. The stumps left in the ground were watered, and gave, in six weeks, a second cutting of 3,800 lbs. fodder."

Sugar-cane.—"Two plots of sugar-cane measuring one acre and half an acre were planted in March 1876.

"Plot No. 1.—A portion of this plot, which was planted entirely with the white variety, was devoted to experiments with manures, such quantities being applied as were equivalent to an expenditure of Rs. 40. The following are the weights of the canes of duplicate plots of $\frac{1}{10}$ an acre:—

Manures.	No. 2 plot.	No. 7 plot.	Mean Result in Lbs. per Acre.
Unmanured	Lbs. 2,064	Lbs. 2,046	82,200
Village refuse, 1 load, honge cakes, 4 maunds.	1,813	2,079	77,840
Village refuse, 1 load, castor-oil cake, 4 maunds.	1,893	1,917	76,200
*Village manure, 2 loads	—	1,680	67,200
*Lime	1,155	—	46,200
*Honge cake, 8 maunds	1,924	—	76,960
*Castor-oil cake, 8 maunds	—	2,074	82,960

* The second plots of these were unreliable, as they were exposed to wind, and were in proximity to a clump of bamboos which absorbed a portion of the manure and water.

"These results, which are excessively high (55,000 lbs. being an average crop) are due in a great measure to the deep cultivation and thorough aëration the land experienced by being broken up deeply, early in the year, and then lying in a rough state exposed to the atmosphere for some months. Previous to the opening of the farms, the ground suffered severely from supersaturation and an occasional overflow of weak sewage water. The canes on the unmanured plots found, in the deep aërated soil, ample nourishment, as, under the native system of cultivation it had only been dug to about eight inches in depth, and had never been allowed to thoroughly dry. In consequence, an enormous amount of plant food was stored up, and being un-aërated, was, to a great extent, unavailable; and thus year after year, while the fertility as garden land was kept up by constant supplies of manure applied to the few inches of surface soil worked, a store gradually accumulated at a deeper level which was untouched. The canes on the other plots, under the same conditions, did not avail themselves of the extra manure, and it probably lies in a great measure undecayed, and will only yield up its constituents to subsequent crops when they begin to find the more easily assimilable sewage salts fail."

Guinea-grass was planted as an experiment to test the relative value of manures, on irrigated and unirrigated plots during dry weather. Plot No. 1 was watered eight times. The manures in both plots were dug in between the rows of grass, and the land left as rough as possible. No rain fell during the experiment, nor had any fallen for some time previous. The lime was applied unslaked. The results are given in lbs. of green grass per acre:—

Manures.	Plot No. 1 Irrigated.	Plot No. 2 not Irrigated.
No manure	2,520	1,200
Ippe cake	4,160	1,160
Village refuse	4,480	1,360
Lime	4,880	3,920

Kusumba.—"This plant, useful both for grain and dye, has withstood the dry weather better than any other crop, indigenous or imported. A plot of ground measuring 4,193 square yards, which had been prepared by a thorough cultivation with English implements, was sown on August 22nd. The land having had no crop for some years, and it being desirable to offer every facility for cleaning, the seeds were sown by hand

in rows two feet apart. When a few inches high, the hoes were set to work and the land kept stirred and free from weeds.

"The crop was harvested on December 23rd, and yielded 265 lbs. of seed, or at the rate of 282-2 lbs. per acre.

"A second plot, sown broad-cast September 15th and harvested February 5th, yielded at the rate of 220 lbs. per acre. During the time the crop was in flower, the petals were sold to a contractor who picked them for the preparation of dye. Considering the season and the late sowing time, the return shows that it is useful to grow on dry land with a rainfall insufficient to bring to maturity gram, wheat, and other late sown crops."

This is all the information we have regarding the operations conducted on the Bangalore Farm. But from an article in the *Madras Times* newspaper, it appears that Mr. Harman proceeded on a tour in the districts of the province, and in August last he was in the Hassan District, showing the ryots the advantages that may be gained by the English plough, and teaching them the use of it by practical demonstration. Tours like this, the Chief Commissioner said in a letter to the Government of India dated 11th April 1878, were to be made in various parts of the province, and they would comprise two periods, one from June to August, during the cultivating season for the dry (ragi) crops, and the other during the cold weather months when the crops are harvested.

Berar.—In Berar the cotton farm at Akola which was started as an agricultural experimental farm, as a tentative measure for five years, did not prove a success, and after a short trial it was closed. I have, however, not been able to get the necessary papers to ascertain under what circumstances the experiment failed.

Central Provinces.—In the Central Provinces, the Nagpore Farm, which had been under the Cotton Department, was placed under the Local Administration, and Captain Macdougall, who had studied the English system of farming while at home, was appointed superintendent.

The farm contained in all 461 acres, and was situated on the south bank of the Nag Nadi, the Southern Road bounding it on the east, and the Ambajhari Reservoir on the west. The soil was generally poor, and where the good was to be found, the depth was very insufficient for the growth of good crops. The sub-stratum was muram or decaying trap, and this grit was constantly cropping up all over the farm. It was not found advisable to plough too deep for fear of raising the poor weak sub-soil, and it was therefore found necessary to improve the surface soil. Work began regularly in 1873, and drainage work was especially attended to; roads were made and fields were divided into blocks.

The agricultural experiments in this, the first year, did not prove at all successful, and the Chief Commissioner, in reviewing the farm report, said that the results were very discouraging. The following year, 1874-75, the operations again gave little encouragement, and Captain Macdougall attributed the want of success to the nature of the soil. He said that he could not report very favourably of the soil during this second year, but he thought that each year's operations, leaving behind a certain amount of vegetable matter, must enrich the land in the end; and this end, he said, would be more rapidly obtained if he could procure a good supply of manure.

The year after, 1875-76, the results proved much more favourable; the soil had much improved; and it was settled that the farm should be worked in three divisions, thus:—

I.—A small part, as an experimental farm, for trying new crops and modes of culture.

II.—A large part as a farm for green fodder crops.

III.—The remainder, as a model farm proper, whereon ordinary staple crops should be grown to the best advantage on commercial principles.

An irrigation channel from the Ambajhari tank had been completed, and the area brought under irrigation was 166 acres. A difficulty, which had been experienced in procuring manure, was being got over by an arrangement which was being made with the municipality for taking over all the night soil and sweepings of the town.

Although, after a most propitious first burst of the monsoon, the rainfall had been too continuous, still, on the whole, the season was not altogether unfavourable. A total area of 292 acres was under cultivation.

"The natives," Captain Macdougall said, "acknowledged the superiority of some of our implements, and it only wants persistent working of others to show how much labour is saved, and harvesting rendered easy. One improved native plough with English mould-board attached was during the year sold to * * *, the proprietor, in fee simple, of the village of Mohogaon. He has reported in high terms of praise of the work performed by the implement, and has been asked by various neighbours to let them have it on loan."

The most noticeable results of the crop experiments were the following:—

Cotton.—Six acres were sown with cotton, the land being manured with the previous years' cotton seed. Several pickings were obtained, and these yielded a weight of 304 lbs. of clean cotton per acre; the yield during the previous year had been 84 lbs. per acre, and average yield of the ryots' crops was understood to be less than 28 lbs. per acre. A very careful selection of the seeds from the crop which produced 304 lbs. per acre was made. "It may be here noticed that this 6-acre plot attracted much attention from ryots, who, in ascribing various causes for the lasting properties of the plants, admitted that deep cultivation had a very leading influence."

Wheat.—Next, a wheat crop may be noticed, which was sown early in October in drills nine inches apart, on two acres of land manured with sweepings. A couple of days after the first rains, a fine braid showed itself, and the plants never ceased growing till the end of December, when the ears began to form. The yield was at the rate of 616 lbs. per acre. When the crop was in the ear, it was noticed that there were two sorts of wheat mixed up; one, a red-eared wheat with a thick, short, fore-sided, compact ear, well filled, and having the appearance of a heavy cropper; the other, a white-eared variety, more elongated in the ear, less compact, and wanting a look of strength. A good supply of the seed of each of these two varieties was secured for the following year's experiment.

Several other crops were tried, and among these we find that linseed was sown early in October, the land being manured, and produced at the rate of 486 lbs. per acre. Mote and lemon-grass are said to have succeeded, and to have furnished fodder, which was readily consumed by the cattle.

The year 1876-77 gave continued good results, and the Chief Commissioner, in reviewing Captain Macdougall's report, remarked that "the degree of success which has now been reached affords ample encouragement for the future." Captain Macdougall said: "our farm lands * * * are becoming well stored with fertilizing ingredients, and yearly a marked change is seen in the crops." Latrine and cattle manures continued to be used, and in addition to these bones and lime formed a portion of the experiments. The irrigation channel and its supply had a full year's trial, and the supply of water did not prove so full as had been hoped, for while during the rainy and cold season the supply was abundant, during the hot season it did not suffice for more than about 16 acres out of the 166 acres irrigated at other times.

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Cotton.—The cotton seed which had been selected from the previous years' produce was sown, and gave a yield of 326 lbs. of clean cotton per acre. This result was effected partly from improvement in the plant, gained by careful cultivation, and partly from irrigation. The experiment had been carefully watched by several ryots.

Lucerne grass was grown, and yielded nearly three tons of fodder per acre, "and the yield would have been nearly doubled had not about half an acre been reserved for seed."

But this crop, which is a perennial one in other soils and parts of India, can only be treated as an annual at Nagpore, owing to the hopelessness of carrying it through the rains.

Pissi wheat, which strongly resembles English wheats, was sown late in November, too late in fact in the season, and the seed obtained was not of good quality. Yet the crop, after having been irrigated three times, yielded 600 lbs. of wheat per acre. Some strong plump seeds from this were selected and reserved for the following years' trial.

Oats bore a fair crop, returning 1,100 lbs. to the acre; but the ryots do not appreciate the grain as food, owing to its being so glutinous to their taste.

On the *fodder farm* guinea-grass, lucerne, lemon-grass, sweet potatoe, and hariali all passed beyond the experimental stage, and "can be successfully cultivated on a large scale as fodder." Symphatum still required further trial. Oats and barley were more or less a failure, and they seemed unsuited to the Nagpore Farm.

The hariali gave heavy crops of fine hay during the rains and cold weather, and the produce was between 3 and 3½ tons of hay per acre. Besides this, "after the hay is removed, irrigation supplies a good 'aftermath,' which remains green and sweet, and 'can be eaten down by the cattle from time to time.'"

Sweet potatoes proved to be a good forage crop; the produce was about 3 tons per acre, and this could be repeated three times at least in the year, allowing the planting out to occur in October.

"The cattle have eaten it freely, the cultivation of the crop is very simple, and it is not a greedy drinker wanting much irrigation."

The *commercial portion of the farm* again proved a success. 307 acres were cultivated at a total cost of Rs. 1,407, or about Rs. 4½ per acre; and they yielded produce worth Rs. 3,500 or Rs. 11½ per acre.

The chief crops raised were the following:—

Wheat.—In the report for the previous year it was said that some farm-grown wheat had been separated into two distinct varieties, *viz.*, white and red-eared wheats. To these the Jelalia wheat of the Nerbudda Valley was added, and all three varieties were sown on a six-acre field of irrigated land that had been heavily manured in 1875-76 for cotton. The field was divided equally, each of the three varieties having 2 acres, and only one irrigation was given, the spring rains having supplied the necessary moisture for a second watering. The out-turn was:—

	Per acre.
	Lbs.
Jelalia - - - - -	1,600
White-eared - - - - -	2,200
Red " - - - - -	920

"The yield of the first two," Captain Macdougall said, "is quite up to the average of English farming 'per acre; while the comparative failure of the red-eared stock is mainly due to the 2 acres it was grown on, being of a sandy, gritty soil, somewhat too light for a good crop to be expected. The heavy yield of the Jelalia and white-eared kind shows that high farming will pay."

The quantity of seed that was sown was 40 lbs. per acre, whereas the ordinary ryots of Nagpore sow 50 lbs., and the Nerbudda Valley ryots sow 80 lbs. per acre, and obtain a yield, respectively, of 400 and 800 lbs. per acre.

In another field which was in its fifth year of continued cropping, and had been manured in 1872, the out-turn obtained from the white-eared variety was 700 lbs. per acre.

Jowar, the staple food grain of the poorer classes in the Nagpore Division, was sown in different soils, and the out-turn varied according to the nature of the soil from 531 lbs. to 232 lbs., the yield in the preceding year having been 206 lbs. and 45 lbs. In the year under report the jowari fields yielded a second crop of grain and fodder, as the shoots sprouted under the unwonted rains of January. This extra crop gave 71 lbs. per acre.

Linseed was the last of the chief crops grown, and its yield varied from 529 lbs. per acre on a field which contained a patch of the very best soil on the farm, to 121 lbs. per acre on a field at the extreme west, then recently taken over from ryots. White or Howrah linseed, which holds a higher place as an oil producing seed than the red kind, in the local market, was tried for the first time and returned 286 lbs. per acre.

"This is, however," Captain Macdougall remarked, "susceptible of improvement." "Our red linseed," he said, "is pronounced by dealers to be of first class 'quality; and having got this, the yield has to be 'increased.'"

This ends the summary of the operations of the Nagpore Farm, and now we go on to the Bombay Presidency where the Bhadgaon Farm in Khandeish, the Nowlur Farm in Dharwar, and the Saluru Farm in Hyderabad, were in existence.

The *Bhadgaon Farm* consisted of 2,505 acres of land held temporarily at grazing rate, and 533 acres subject to full survey assessment rates. It had four wells for irrigation purposes, and the Jambda Canal, which flowed round a good portion of its area and let in its water by means of irrigation nullahs which intersected the fields here and there. The cost of working the farm in 1873-74 was rather heavy, the land at the commencement of the year was full of weeds, and until these were quite eradicated, full advantage could not be taken of the facilities which the canal afforded for irrigation. The annual grant for working the farm was, moreover, small, and this prevented the cultivation of a large area under irrigation, as both the irrigation rate and the extra cost for the necessary manure under such a system had to be paid.

In 1873-74, 464 acres were under cultivation, and of this area 98 acres were under *cotton*. The weather was at first very favourable for this crop, but the prospects of what would have been an unprecedented crop were spoiled by the season having turned out unpropitious; during the break in the rains in August the crop was attacked by a species of "Aphis," and when the rains came on again in September, the heavy downpours stripped the bolls, flowers, and leaves. The details of the cultivation of the cotton are the following, these being some of the best results produced:—

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Variety of Cotton.	Area Sown.	Lbs. of Seed Sown.	Date of Sowing.	Manure Used.	Date of Picking.	Out-turn of Seed Cotton per Acre.	Out-turn of Clean Cotton per Acre.	After what Crop Sown.
Model Farm, Hingunghat	A. G. 6 28	80	June 10th -	None	Oct. 6th to Dec. 14th.	Lbs. 613·13	Lbs. 176·56	Tobacco.
Ditto - - -	7 10	91	" 9th -	"	Sept. 27th to Feb. 10th.	556·27	160·28	Tilly.
From Dhurungam - -	1 27	14	" 18th -	Dissolved bones.	Nov. 29th to Feb. 24th.	302·08	87·16	Jowari.
Ditto - - -	1 27	14	" 18th -	Superphosphate.	Nov. 29th to Feb. 24th.	358·21	103·28	Do.

Ambari, a fibre superior in appearance as well as in strength and durability to the purchased article and also to sunn, was every season cultivated to a small extent to supply the requirements for ropes for agricultural purposes on the farm. The seed was always sown with the seed of the jowari and tilly crops. That raised amongst the jowari was allowed to ripen its seed (which are useful both as oil seed and as cattle food) and was as a rule cut after the jowari was harvested. That sown amongst the tilly was cut whilst in flower, in order that it may not impoverish the soil for the following rabi crop. The latter generally produced the whitest and most glossy fibre, the former the longest and strongest. The quantity cultivated in 1873-74 produced 1,076 lbs. of fibre. The extent sown, or the proportion of produce per acre of land sown, is, however, not given; but it is stated that the cost of cultivation, &c., was Rs. 54-15-6, while the value of the fibre produced was Rs. 53-12-9, and that of the seed obtained was Rs. 36. This, therefore, gave a profit of Rs. 33-13-3, after deducting the cost of cultivation, &c.

Sugar-cane was also grown. The best result was that which gave a net profit of Rs. 73-3-4 per acre. The total expenditure had been at Rs. 174-0-6 per acre, and the value of the out-turn was Rs. 247-3-10

per acre; 32 tons per acre of purchased farm-yard manure was used, and irrigation water was supplied from the Jambda Canal. No details of cultivation and weight of produce are, however, given.

Several other crops were tried, but neither the details of cultivation nor the weight of produce are given; only the financial aspect of the experiments are reported on, and these do not show that any marked success was achieved; in some cases, on the contrary, a loss was sustained on the cost of cultivation. The Bombay Government, in reviewing the report, noticed that no less than 40 different products were grown, for many of which there was no local demand.

"This seems," they observed, "to show that sufficient attention has not been given to the main object of the farm, which is to improve the native 'method of agriculture.'"

In 1875-76 there was an increase of 21 acres in the area under cultivation. The season had not been a good agricultural one; the rainfall had been somewhat scanty, and particularly irregular and unseasonable.

139 acres were under *cotton*, divided into 17 plots. The land was in good order and cultivated on the ridge principle, but the crops proved variable in the extreme. The greatest yields were the following:—

Variety of Cotton.	Area Sown.	Lbs. of Seed Sown.	Date of Sowing.	Manure Used.	Date of Picking.	Out-turn of Seed Cotton per Acre.	Out-turn of Clean Cotton per Acre.	After what Crop Sown.
Hingunghat -	A. G. 12 15	160	June 21st -	None	Oct. 26th to Jan. 12th.	Lbs. 258·34	Lbs. 75·55	Last year's sugar-cane crop, which was but sparingly manured.
Ditto -	10 0	94	" 21st -	"	Nov. 8th to Jan. 6th.	338·4	98·98	Field gravelly in parts, but beautifully workable.
Ditto -	7 0	85	" 25th -	"	Nov. 3rd to Jan. 27th.	443·14	129·73	Fine land. Liberally manured for sugar-cane year before last.

Sugar-cane was grown in 15 acres of land. The cost of the cultivation was Rs. 61-10-9 per acre, and the value of the out-turn was Rs. 73-11-4 per acre, giving a profit of Rs. 11-15-7 per acre. But neither the details of cultivation nor the weight of the produce are stated.

The Bombay Government having made a special grant of money for sericultural operations, a mulberry plantation which had been reared previously was extended and skilled labourers were sent for from Bengal.

"A good deal of attention was devoted to the extraction of fibres and to the collection and propagation of fibre producing plants." But besides this general statement of the fact, no detailed account of the operations is reported, neither is the weight of any produce given. A ton of hemp was prepared and sent to the Flax Supply Association of Belfast;

samples of flax and tow were sent to several farms in Bombay, Dundee, and Ireland, and working samples of various fibres to the Dundee Chamber of Commerce; but the results are not stated.

The cultivation of tilli resulted in a loss of Rs. 130-7. Bajri failed, as also indigo, gram, wheat, maize, earth-nut, &c., while jowari, aal, tobacco, linseed, capsicum, hay, &c., yielded small profits.

In 1876-77 the area under cultivation was the same as that in the previous year. The rainfall was very scanty and irregular, and quite unequal to the production of a full crop. Still the results of the experiments were considered very encouraging by the Revenue Commissioner.

138 acres were under cotton, and some of the best results of the plots into which the area was divided were as follows:—

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PROVINCES.

Description of Cotton.	Area Sown.	Lbs. of Seed Sown.	Date of Sowing.	How Manured.	Date of Picking.	Out-turn of Seed Cotton per Acre.	Out-turn of Clean Cotton per Acre.	Remarks.
Hinganghat	A. G. 13 22	145	June 16th	None	Nov. 11th to Jan. 11th.	Lbs. 178.22	Lbs. 53.40	
Ditto	9 39	132	" 17th	"	Nov. 22nd to Jan. 18th.	182.65	54.60	
Ditto	11 9	128	" 16th	"	Oct. 28th to Jan. 9th.	342.9	102.60	
Dharwari	8 29	109	" 17th	"	Oct. 30th to Dec. 28th.	157.59	47.10	
Ditto	4 33	60	" 19th	Night soil and earth.	Oct. 23rd to Nov. 30th.	195.85	58.50	Three waterings from the canal.

Bajri was grown on 73 acres divided into nine plots, and the crop on the whole proved to be a good one, considering the unfavourable season. The total profit from the whole area was Rs. 205-10; but as usual the details of cultivation and the weight of the produce are not given.

Wheat was sown to the extent of 47 acres, and notwithstanding the bad season and the pilfering that took place from a neighbouring village, the produce was reckoned at 15 to 16 bushels per acre. Some seed was distributed through a merchant to the village cultivators under the usual condition of payment, and a quantity was left on the farm.

Tilli proved much more paying than in ordinary years; the seed was all clean and of good quality, and gave a profit of Rs. 211-13-6 over the cost of cultivation.

Sugar-cane was grown to a much smaller extent, because almost every village had become well stocked with the Mauritius cane that had been imported and distributed through the farm, and did not therefore require much seed.

The seeds of various trees were planted out.

The *Carob tree* had just sprouted. The *Arnatto*, which had been the subject of experiment in the early days of the farm, was represented by only one fine large bush which "yields annually two or three crops of seed," and experiments showed "that colouring pulp" is readily precipitated by the same process observed "here in the case of indigo."

The *Sweet Inga* was thoroughly established all over the farm, and it yielded a timber well suited to the requirements of an agricultural district. The pods, "which have been exceedingly abundant this year," afford a sweet and nourishing food in the pulp they contain," and "the weight of pulp contained in each pod is about $\frac{1}{4}$ oz., so that a full grown tree yielding, say 1,000 pods, would produce 250 lbs. of "food."

The *Divi-Divi* tree was also very fruitful, and produced in the year under report 5 cwts. of pods. The seeds were made into packets of 2 dozen seeds each, and distributed to each village patel in the collectorate.

The *Nowlur Model Farm* is situated about 3 miles south-east of Dharwar on the main line road. It was started in June 1873; the soil was of great variety; water could be had close to the surface, and altogether "a better spot could not have been selected for model farm purposes." The area of land taken up was about 230 acres of arable land and about 175 acres of grazing land; but owing to the lateness of the season at which the operations were commenced, and to the smallness of the grant of money made, only 74 acres 22 guntas of land were cultivated. Immediately after the first fall of rain in July, sowing was commenced with jowari, and was followed by cotton,

wheat, and gram. The following is an abstract of the results of the operations field by field:—

Field No. I.—Rainfall pretty fair; soil partly good, black, partly a mixture of black and red, and red and stony; previous working had to all appearance been much neglected. Therefore it was deeply ploughed up with English ploughs, and well stirred. The inferior portion of the field was sown with jowari, tur, and mung, and the good black with indigenous cotton.

The yield of jowari "and other grains" was at the rate of 403 lbs. per acre, and the yield of cotton was at the rate of about 154 lbs. of clean cotton per acre.

Field No. II.—Much like the 1st field, but situated under a large tank and a well; it was sown with jowari and other grains, and also with cotton. The produce of grain was about 655 lbs. per acre, and the produce of cotton (hybridized and selected seeds and acclimatized New Orleans) was only 75 lbs. per acre, owing partly to blight, and principally to decay of the seed from long keeping.

Field No. III.—Ordinary black soil, was well ploughed and carefully manured, and was sown partly with wheat and partly with cotton; but the want of rain after the sowing caused a failure, giving only 16 lbs. of clean cotton per acre, and 178 lbs. of wheat per acre, including kusumba.

Field No. IV.—Soil a loamy red, under a large village tank, and used for growing rice, sugar-cane, and market vegetables. After being prepared, the land was sown with acclimatized New Orleans cotton seed purchased in the market, and containing an admixture of indigenous cotton seed. The rainfall was fair, the plants grew well, and yielded 140 lbs. per acre, a full crop in Nowlur and other villages being looked upon as producing 130 lbs. per acre.

Field No. V.—Has soil of three classes—good black, red and black, and poor shallow red. It was ploughed and manured and divided into plots and sown with cotton, country wheat, sorghum, English oats, barley, gram, jowari, &c. The only produce worth mentioning was wheat at the rate of 251 lbs. per acre; and jowari, at 270 lbs. per acre; all the rest were failures, more or less.

Field No. VI.—Consists of good black soil throughout, and nearly one-half could be irrigated from a well at one end. The land having been prepared and sown yielded jowari at 652 lbs. per acre, and wheat 188 lbs. per acre.

Field No. VII.—Is of a black soil and had been much neglected. It was prepared and sown, but did not give any yield worth mentioning.

In 1875-76 the season, which had promised to be a favourable one, and had helped the sowing of the early crops in good time, turned out to be unusually dry, and the early setting in of sharp cutting easterly winds in October destroyed all hope of a good yield. The best results, however, were the following:—

Field No.	Extent Sown.	Names of Crops.	Produce per Acre.	Remarks.
	A. G.		Lbs.	
1	6 7	Jowari - - - Tur - - - Mutt - - -	444	Was manured previous year with poudrette, slaughter-house refuse, and crushed bones and lime
2	1 31	Sugar-cane - -	Rs. 140 A. 13 P. 6	Manured with slaughter-house refuse and poudrette.
	$\frac{1}{2}$ 0	Lucerne - - - Jowari - - - Tur - - - Mutt - - -	Lbs. 27,708	
3	8 14	Jowari - - - Tur - - - Mutt - - -	338	Good dressing of poudrette, slaughter-house refuse, and farm-made manure was put on.
4	—	—	—	Fields under the tank all did poorly; some were not even cropped from being too wet at one time and too dry at other times.
8	$\frac{1}{2}$ 0	Potatoes - -	4,214	Ploughed with English plough and dressed with 12 carts of poudrette.
9	0 31	Jowari - -	326	Dressed with patent manure at 3 cwt. per acre.

The rainfall in 1876-77 was very scanty, and the result on the farm did not, consequently, turn out so favourable as was expected, "especially as the fields had received a liberal dressing of manure."

Jowari yielded 183 lbs. per acre, "which, though poor, was considerably better than the yield of many of the surrounding fields." *Wheat* gave a produce of 228 lbs. on 2 acres 25 guntas of land. Another plot, which had been under cotton the previous year, and was dressed with village manure, produced 110 lbs. of wheat per acre. A fourth field, which received a good dressing of farm-made manure after having been thoroughly cleaned, yielded 320 lbs. of jowari per acre.

The half-acre which had been under potatoes the previous year, and another $1\frac{1}{2}$ acre which had been under jowari (in all 2 acres), were put under potatoes. "All the plants grew remarkably well during the early part of the season, and had rain fallen in August, an exceedingly fine crop could have been obtained. As it was, the yield came to 2,670 lbs."

A plot of 13 guntas was under American grass, and did well for a time; but in the end want of water became serious, and the supply gradually fell below demand. The out-turn was 5,666 lbs.

The farm was closed after the operations of 1876-77.

On the Salaru Cotton Experimental Farm 155 acres were cultivated, and 101 acres 26 guntas were fallow. The season was late, and although not quite unfavourable, the rainfall was only 4.71 inches.

Experiments were made with several varieties of cotton and the following are some of the best results obtained in 1873-74:—

Variety of Cotton.	Area Sown.	When Sown.	No. of Waterings.	Weight of Produce.
Sind native	A. G. 6 5	12th June to 17th July	6	Lbs. 5,731
Ditto	6 21	8th " to 18th "	6	5,179
American	1 10	28th " to 6th "	6	1,035
Ditto	1 8	27th " to 30th June	5	1,174
Ditto	0 8	10th July	4	220

Bajri was also tried on the farm, and the following table shows the best results. None of the fields were manured:—

No. of Waterings Given.	Date of Sowings.	Area.	Produce.
			Grain. Kirby.
Three	28th July to 4th August	A. G. 7 22	Lbs. 4,525 $\frac{1}{2}$ Bundles. 680
Three	7th " to 29th July	4 22	4,406 914
Three, not finished.	8th " to 4th August	10 39	7,633 $\frac{1}{2}$ 1,366

Sorghum saccharatum, sown 24th June in an area of 33 guntas, yielded 772 lbs. seeds and 195 bundles or 96 maunds kirby—*dry weighed*. This crop got the same amount of care as did the *bajri* crop, and was sown in the same kind of soil as the second of the above noted trials. Their respective yields may be compared thus:—

Bajri—	Lbs.
Grain per acre nearly	790 $\frac{1}{2}$
Grass " "	5,678
Total	6,468 $\frac{1}{2}$

Sorghum—	Lbs.
Grain per acre	935 $\frac{3}{4}$
Grass " "	9,774 $\frac{1}{2}$
Total	10,710 $\frac{1}{4}$

Other crops were also grown—for instance, sugar-cane grown on 8 guntas of land yielded a produce of 420 lbs., and sweet potatoe on a plot of 33 guntas gave 760 lbs. of produce.

In 1875-76, in the first week of April, an acre of land on the farm well, which had been previously manured and ploughed with English plough, was sown with *Sind native cotton*. The plants, large and strong, began to yield in September, and the picking was over when the cold weather set in. The total yield was 1,884 lbs. of seed cotton, or 628 lbs. of clean staple.

Including the above acre, the total area under *Sind cotton* was 16 acres 21 guntas. The plants were fair, but they were much damaged by green fly towards the harvest time, and the total yield was 20,357 lbs. seed cotton, or clean staple 410 $\frac{3}{4}$ lbs. per acre.

The American cotton also was attacked by green fly, and all but destroyed. The total yield of seed cotton was only 768 lbs., or about 221 lbs. per acre of clean cotton.

Sorgho was again grown, and yielded per acre—

	Lbs.
Grass or kirby	39,980
Grain	1,176
Total	41,156

CHAP. I. QN. 7. *Bajri* was sown during the rainy days in July, and the yield per acre of feeding material was—

		Lbs.
CENTRAL PROVINCES.	Kirby or grass - - -	10,672
	Grain - - -	1,189
	Total - - -	11,861
PUNJAB.		
NORTH-WESTERN PROVINCES.		

The season 1876-77 was a bad one for cotton, and the return generally in the district was much lower than that of the previous year. The highest yield of cotton obtained in the district was that from the Government fields, where 3 acres 19 guntas produced 5,496 lbs. of seed cotton, equal to fully 527 lbs. clean staple per acre.

Bajri.—Though the season was unfavourable for cotton, it was an excellent one for grain in that part of Sind, and the farm fields gave a return of 1,420 lbs. per acre, which is the highest yield yet obtained; “kirby or grass was also good.”

Tobacco planted in half an acre in 1876-77 gave a produce of 1,365 lbs. This was the third crop off the same ground without any rotation being allowed.

“The first crop was luxuriant enough, but the nicotine principle seemed to be very deficient, and, as a consequence, the leaves were pronounced inferior by native merchants; it was with difficulty sold at Rs. 1-14 per pirdi of 168 lbs. The second year’s produce, was a great improvement on the first, and sold for Rs. 2-12 per pirdi of same weight. The past year’s crop was an improvement again on the previous season’s return, and it sold at Rs. 5 per pirdi of 168 lbs. The varieties planted were common Sindi, Havana, Virginian, Shiraz, Connecticut seed leaf, and Kentucky.”

Flax.—“One acre was sown with flax seed received from the Khandesh Farm. The ground which had previously borne an early crop of sorgho was well ploughed, manured, and watered, previous to sowing, after which it got no water; it produced 396 lbs. of very fine full-plump seed; but the fibre will be useless for any purpose except, perhaps, paper-making. The stems are much branched, and only from a foot to 18 inches long; 53 lbs. of seed was sown in this acre.”

Punjab.—The efforts in the way of experimentalising proved fruitless. The Cotton Chandi Farm after having been open for some time was closed, and an agricultural farm at Amritsar* was started, and this also was closed after a trial of three years. It could not, however, have resulted in anything but failure, as the operations were commenced and carried out during those three years without either proper irrigation water or manure being provided for, and without any proper sheds for the cattle and sheep. The land needed to be improved, but the Lieutenant-Governor said after the third year’s trial “it is inadvisable to go to any large expense in the construction of sheds for cattle or for planting and improving the land.” * * * The Lieutenant-Governor “is not unfavourably disposed towards these experimental farms,” but he “considers that, if undertaken and maintained by the Government, they should be in situations and under circumstances which may render their success at least probable. His Honour believed “that the Amritsar Farm can never be anything but a failure.” The circumstances being so unfavourable, it is not explained why the farm was started at Amritsar at all, and when started why it was maintained for three years without any large expense being incurred for planting and improving the land.

North-Western Provinces.—The Allahabad Farm† in 1873-74 consisted of 153½ acres of land, and rented

* Mr. Lloyd, superintendent.
† Mr. J. Phillips, superintendent

105½ acres to cultivators. The soil was naturally of a good character except where it adjoined the high land, most of it being level low-lying, and of alluvial description. The farm had no means of irrigation; but since the commencement of operations (two years previously) the land had greatly improved, owing to the use of the English plough. The improvement seemed “very evident to the native cultivators, as they have readily given for land, prepared by the English plough and manured with bazar sweepings, Rs. 55 and 60 per bigha for a period of 2½ years. The Government rent of this land yearly is Rs. 9 per bigha, or Rs. 22-8 for 2½ years; the cost of preparing the land with the English plough per bigha being about Rs. 2-2, and allowing Rs. 5 for manure, gives a total of Rs. 29-10, being a profit to Government of Rs. 30-6 per bigha, or more than double.”

The following were the experiments carried out in 1873-74:—

Wheat.—Half an acre was sown on land manured with night-soil, and yielded 11 maunds, or at the rate of 22 maunds per acre. Land manured with bazar sweepings gave 16-25 maunds.

Sorghum Saccharatum was sown to the extent of 27 acres, and the fields being divided off, were treated each differently: a portion not manured, but ploughed with English plough, gave 352 maunds per acre; another portion, English ploughed in December and January, and manured with village sweepings, yielded 535 maunds per acre; and a third portion, English ploughed in June and July, and manured, gave an out-turn of 440 maunds per acre.

Jowar was tried on 11 acres: the land was treated as for sorghum, and sown in July. The yield of karbi per acre was 307 maunds 18 seers.

Barley was treated with Compton’s patent manure, which was thrown broadcast at the rate of 1½ maunds per acre, the land being then ploughed with a native plough and levelled down with a plank. The barley was sown in the usual manner and yielded 12 maunds; while a neighbouring plot, which had been manured the preceding year with bazar sweepings, gave 11 maunds 12 seers. During the whole period of the experiment there had been no rain whatever.

Oats were sown on 14 acres of very sandy land of the poorest kind on the farm: 7 acres were English ploughed and unmanured, and 7 acres unmanured and native ploughed. The land was prepared like that for the barley and wheat. The out-turn on the English ploughed portion was 9 maunds per acre, and that on the other portion was 6 maunds per acre.

In 1874-75, 7½ acres were under *cotton*. The land selected was of third class quality, very sandy, and highly impregnated with lime. It was manured at the rate of 300 maunds of bazar sweepings per acre. A portion to be tried on the ridge system was twice native ploughed, and the portion on the flat was once English ploughed and three times native ploughed, and then levelled. The seed was sown from 21st to 23rd June, the plants were weeded three times and once hoed, and the first picking took place on the 26th October. The following were the results:—

	Out-turn per Acre on the Flat.		Out-turn per Acre on the Ridge.	
	Maunds.	Seers.	Maunds.	Seers.
Dharwar cotton - -	2	25	5	32
Broach - - -	1	34½	5	17½
Bulandshahr - - -	3	19½	5	4½

Sorghum and *jowar* were sown alternately to test their respective values as fodder plants. The land was treated as in the previous year, and the maximum out-turns were—

Sorghum - 625 maunds 0 seers per acre.
Joar - 362 ” 37 ” ”

Other experiments produced the following results:—

Name of Crop.	Area in Acres.	Description of Ploughing.	Manure per Acre.	Dates of Sowing and Reaping.	Quantity of Seed Sown per Acre.	Yield of Grain per Acre.	Yield of Karbi or Bhusa per Acre.
Bajra - -	17½	English	300 maunds, bazar sweepings	29th July - - 9th November - -	3 seers	Mds. srs. 15 10	Mds. srs. 222 8
Maize - -	½	Dug	Poudrette - - -	1st July - - 25th September - -	8 ”	16 27	165 0
Wheat - -	½	Dug	Do. - - -	31st October - - 31st March - -	52 ”	19 10	33 0
Gram - -	7½	Native	None - - -	13th October - - 20th March - -	46 ”	6 33	25 0
Barley - -	½	English	300 maunds, bazar sweepings	22nd October - - 6th March - -	25 ”	35 0	72 0
Do. - -	½	Do.	Do. do. - -	Do. - - -	30 ”	32 0	72 0
Oats - -	16	Do.	Do. do. - -	12th October - - 15th March - -	52 ”	13 0	20 0
San - -	½	Do.	Do. do. - -	13th July - - 16th August - -	30 ”	16 20*	—
Patsan - -	½	Do.	Do. do. - -	Do. - - -	20 ”	14 26*	—

* Clean San.

In 1875-76 the operations were not satisfactory, and the farm, having been placed under the control of the Director of Agriculture, was maintained for the main purpose of proving the value of city manure when properly utilised. The area of the farm (153 acres) was reduced in 1876-77 to 55 acres; and as the farm was badly situated for experimental purposes, this area was considered ample. The other portion, consisting of about 100 acres of manured and ploughed land, was made over to the municipality in 1876-77 in exchange for an equal portion to be made over to the farm which might then undergo a similar process of manuring and improved cultivation. But the transfer having been made late in the season, no result could yet be reported.

On the reserved experimental area of 55 acres, the effects of deep ploughing and manure were ascertained. The crops for the experiment were sorghum, bajra (rain crops), and wheat, barley, oats (spring crops). The following were the results:—

	OUT-TURN IN MAUNDS PER ACRE.	
	English Plough.	Native Plough.
FODDER.		
Sorghum, manured with sweepings -	300	226
” ” poudrette (not trenched) -	—	336
” unmanured -	265	218
Bajra, manured with bazar sweepings -	212	146
” ” poudrette -	—	128
” unmanured -	207	125
GRAIN.		
Bajra, manured with bazar sweepings -	18	17
” unmanured -	16	10
” poudrette -	—	20½

The Bulandshahr Model Farm, under Mr. Simpson’s superintendence, consisted, in 1873-4, of 150 acres of land divided into two plots. The lands, mostly of the class known as jungle, and mostly the outlying

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land of certain adjacent villages, were all conveniently situated for irrigation, there being one of the canal *rajbahs* running adjacent to each plot.

Cotton was grown on 52 acres of land, and was treated in five different modes. The largest yield of clean cotton was 164 lbs. per acre, and was obtained from land deep ploughed and manured and sown on the ridge system. The average yield of the total area was 97-84 lbs. A sample of 300 lbs., which was sent to Messrs. Colvin, Cowie, and Company, of Calcutta, was reported by that firm to be “fine white “Bhimargah class cotton, very free from strain and “leaf.” The staple was said to be “¾ to ⅞ inch, silky, and of good strength.” Its value was estimated to be in the London market at 6¼d. per lb., and its worth in Calcutta for local consumption was about rupees 20 per maund.

Other products gave the following out-turns.

Name of Crop.	Area Sown.	Mode of Cultivation.	Yield per Acre.
	Acres. Roods.		Maunds. Seers.
Wheat (white un-bearded). -	3 3	Deep ploughed and manured.	23 3
Barley - - -	3 1	Ditto ditto	15 6½
Oats - - -	2 2	Ditto ditto	33 8½
Pears - - -	4 0	Ditto ditto	33 3¾
Gram - - -	2 3	Ploughed in the Native manner.	27 38

A few other crops were grown; but the weight of the produce of some of them is not given in the report, while some others did not prove quite successful. The farm was subsequently abandoned.

A third farm, which had been started at Nawabganj in Cawnpore as a model farm, and had been worked by means of grants from Government, at a yearly loss, was placed in May 1873 under the charge of the collector of the district, and was used as a nursery for seeds, shrubs, and flowers. After two years’ operations, under the new management, it was able to show a credit balance of Rs. 3,387-2-9.

In 1874-75 the chief field produce grown on the garden was pedigree wheat, oats, mangold wurzel, swedes, and New Orleans cotton.

The area sown with *pedigree wheat* was 8 acres and 2 roods, and the produce was, per acre, nearly

F f

CHAP. I. QN. 7. 1,200 lbs. of grain, and 22 cwts. 2 lbs. of straw or bhusa. The quantity of seed sown on the whole plot was 171 lbs. 8 oz. only.

Mr. Liotard.

NORTH-
WESTERN
PROVINCES.

BENGAL.

Oats were sown on a plot of land measuring nearly 1 acre, and yielded 1,672 lbs. of grain and 2,064 lbs. of straw.

Mangold wurzel occupied an area of 1 acre 8 poles and gave a produce approximating* 14 tois, 11 cwts. The municipality bought a portion of this produce at 5 annas per maund. At this rate it would be worth Rs. 124; and as the cost of cultivation was Rs. 38-4-11, the profit would be Rs. 86-11-0.

Sweetes occupied about $\frac{1}{3}$ of an area, and produced approximately 8,420 lbs., at 5 annas per maund, which gave a profit of nearly Rs. 22.

Cotton of the New Orleans kind covered an area of $\frac{3}{4}$ of an acre in the second year of growth. The plants of the first year were cut down in June, and irrigated once in the cold weather. The yield was 378 lbs. of kapas, and about 280 lbs. of binola.

In 1875-76 the portion of the farm devoted to fruit trees (15 acres) yielded Rs. 1,102-8-9, and the outlay had been Rs. 350. The flower garden portion yielded Rs. 1,457-6-8. And the farm portion was mainly confined to the cultivation of tobacco, without any very good results, as the time given was short.

In 1876-77 the fruit and flower garden portions again gave a good profit; while the farm continued to afford encouragement in its results.

English and native ploughs were used on exactly similar land, and the results were, in eight out of ten

* It had not all been taken up at the time.

fields, favourable to the English implement, and pre-eminently so in the case of sorgo, maize, and peas; but the results are not specified. The cost of ploughing with the English is also said to be less than that of ploughing with the native implement.

The next experiment was with canal irrigation. A field of about $1\frac{1}{2}$ acres in area was watered consecutively for two years, $\frac{1}{3}$ with canal, and $\frac{1}{3}$ with well irrigation, a third and equal portion being left dry. The results with barley in the second year were—

Well	-	-	-	-	Lbs.
Canal	-	-	-	-	1,642
Dry	-	-	-	-	1,536
	-	-	-	-	1,260

There was, however, too much rain to allow of a fair comparison between irrigated and dry land.

A portable sugar mill from Behar, patented by Messrs. Milne and Thomson, indigo planters, and adopted by six cultivators in Behar, was procured for trial on the farm. It proved "its superiority over the native mill at once, by turning out double the quantity of juice at half the cost of labour." The chief merits in the mill are its portability and simplicity. A large number are now being introduced into the Court of Ward's estates.

Bengal.—The many farms that had been started all proved fruitless, and they have all been closed. I do not give any account of their operations during the short time they were in existence, as Mr. Toynbee has already given a summary on the subject in his compilation of answers to the questions of the Famine Commission.

CHAPTER I.—QUESTION 8.

What proportion of your population is agricultural, that is, either directly engaged in the cultivation of the soil solely, or in combination with some other occupation, or deriving their chief income from the land? And of this class what proportion live entirely by the profits of the cultivation of their own land, and what proportion support themselves wholly or in part by field labour for others.

CHAP. I. QN. 8.

PUNJAB.

PUNJAB.

Major Wace.

There are three main points in this question :—(a.) The proportion of the population which lives chiefly by agriculture. (b.) The extent to which that portion of the population combine other operations with agriculture. (c.) The extent to which agriculturists supplement the profits of cultivation of their own holdings with wages earned in field labour for others.

To enable me to answer this question and question 15, I have compiled from the census papers of 1868 a statement of population according to occupation, which is appended to the reply to question 15.

Division.	Per cent. of total population who are agriculturists.	Number of Agriculturists.	
		Total.	Adult males above 15 years of age.
Delhi - - -	51	976,787	357,167
Hissar - - -	66	813,288	259,849
Umballa - - -	51	835,155	322,252
Jullundur - - -	61	1,504,685	446,469
Amritsar - - -	45	1,237,256	448,943
Lahore - - -	54	1,026,686	304,542
Rawalpindi - - -	60	1,317,640	349,589
Mooltan - - -	50	740,051	209,882
Derajât - - -	60	593,662	232,214
Peshawar - - -	62	638,372	173,942
Grand total	55	9,683,580	3,104,849

The per-centage of the population therein returned as agriculturists is for the whole Province 55 per cent., of whom one in three are shown as adult males above 18 years of age (a proportion certainly too large).

The statement in the margin shows the number for each division.

As regards the next point, the extent to which the agriculturists combine other occupations with their principal livelihood, there are absolutely no statistics available. It is only possible to make a general statement on the subject.

The agricultural classes proper rarely combine agriculture with any other callings, except service in the army or police, and the calling of carriers. A large proportion of the bullock hackeries and camels of the Punjab belong to agriculturists; and so far as this is the case they use these resources with no little spirit to help themselves over bad years. Similarly, in the northern parts of the Sind Sagar Doab and adjacent tracts Trans-Indus, many of the agriculturists turn carriers in the months when agricultural work is slack, carrying salt and grain for the local traders, and sometimes making ventures on their own account; and thus they add materially to their means. They are equally ready to leave their homes and take work on roads and canals in order to tide over bad years. The great majority of the agriculturists, under such circumstances, show very great enterprise; and are not at all the kind of men to sit starving at their homes when they can work as carriers or as labourers. But all the callings of the artisan they regard as beneath them, and rarely, if ever, adopt them.

As regards the third point also, the extent to which agriculturists supplement the profits of their own holdings by wages earned in field labour for others, there are no statistics available; and a general answer must be given. When partial failures of crops occur, such failures as most affect the drier tracts and leave fair crops in adjacent more favoured tracts, the poorer agriculturists of the former usually go to seek harvesting work in the more fortunate districts. Such work is universally paid for by a share of the crop, usually about a twentieth. But saving such exceptional instances, the ordinary condition of agricultural villages is such as to give few opportunities for an agriculturist to supplement the income of his own holding by working for others. All the holdings are small, with few exceptions no larger than the actual cultivators can themselves look after; and for the same reason the cultivators have not the funds to pay for hired labour. Moreover, there is ordinarily so much neighbourly feeling among the cultivators of each village that, when a man does need help for some special work, his neighbours assemble and do it for him, asking no return except a good meal. The help one man needs to-day, his neighbour will need before long; so as occasion arises they all help each other. In villages thus constituted it will be readily understood that there is little opportunity for a poor agriculturist to add to his livelihood by wages earned from others, excepting only at harvest time.

There has always been much doubt and discussion as to the proportion which the agricultural bears to the total population. The difficulty felt in answering the question arises mainly from two causes; one is that occupations are often combined, many persons adding a little agriculture to some trade or profession; the other, that caste and occupation are so closely connected among the lower classes that it is hard to separate them, and if a man returns his caste as lohar or kolie he is put down by the census clerks as a blacksmith or weaver, though he may have actually abandoned his hereditary profession, and live entirely by field labour or cultivation.

2. In the earlier census of 1865, in the North-Western Provinces, no further separation of the people was attempted than that involved in the broad classification "agricultural" and "non-agricultural;" and on that occasion 17,484,905 people were returned as agriculturists, being 59 per cent. of the entire population. In 1872 an endeavour was made to distinguish the landowners from the non-proprietary cultivators, and the enumerators were instructed when a person derived the whole or the greater part of his subsistence from the land, to enter in the occupation column of the returns the words "landholder or cultivator, as the case might be."* Treated in this way, the numbers came out as 17,376,967, or 56·5 per cent. on the total population; of these, 2,046,940 were returned as landowners, and 15,330,027 as cultivators.†

3. But besides those who are distinctly returned as landowners and cultivators, there is a large class who are included in Class VI, "indefinite," and whose occupation is vaguely recorded as being that of "labourers." The adult males belonging to this class are 1,448,087 in number. Those labourers who reside in towns are probably people who live by any kind of manual work; those who live in the villages are all, or almost all, employed in field work. In towns with over 10,000 inhabitants (whose total population is 2,194,000) the returns show 118,202 adult male labourers; it may therefore be estimated that in towns with over 5,000 inhabitants, whose total population is 3,093,000, the number of labourers will be about 166,000. These may be set aside as non-agriculturists, and the balance, or 1,282,000 adult males, may be taken as representing the number of field labourers in villages.†

* Plowden's Census Report, 1872, paragraph 45.

† The adult males over 15 years of age are 10,352,562 in number, or one-third of the population, and are classified thus:—

	No.
I.—Professional	122,030
II.—Domestic service	973,072
III.—Commercial	447,786
IV.—Agricultural	5,937,274
V.—Industrial	1,247,004
VI.—Indefinite	1,625,426

The urban population is about one million adult males, leaving nine millions of rural inhabitants. The indications of the census may therefore be shown thus :—

Urban	-	-	1 million males.
Agricultural	-	-	6 „ „
Rural non-agricultural	3½	„	„

‡ Transferring these to the agricultural class, the occupation statement would stand thus:—

Urban	-	-	-	1 million adult males.
Agriculturists	-	-	$7\frac{1}{2}$	" " "
Rural non-agriculturists		2	"	" "

4. Those, however, who are acquainted with the constitution of an Indian village, and know how very few inhabitants it contains who are not engaged in agriculture, will be satisfied that even these figures do not quite represent the relative proportions of these two great classes of population. It has been stated, and probably may be stated without any great departure from accuracy, that putting aside the urban population, as roughly speaking entirely engaged in trades and professions, about 90 per cent. of the remainder, the rural population, are agricultural.

On this hypothesis the rural population of 9,000,000 males would be divided into 8,000,000 wholly or in part engaged in agriculture, and 1,000,000 of non-agriculturists. But even this residuum is very closely dependent on agriculture. Only a small portion consists of rich people who live on their rents, pensioners, merchants and bankers whose transactions are on a large scale and extend beyond the immediate neighbourhood, priests or members of learned professions who live by the custom and support of the rich. The great majority of rural non-agriculturists are the village servants, the watchman, the sweeper, the barber, the potter, the carpenter, the blacksmith, who work for the cultivators and are paid in grain when the harvest is ripe, and whose remuneration perishes when the harvest fails. The remainder are the village shopkeeper, the grain-parcher, the weaver, and such like, whose employment mainly depends on the prosperity of the villagers, and on their ability to pay for clothes, sweetmeats, and the like. From an administrative point of view, the interests of these trades and employments are so intimately interwoven with the interests of the agricultural community that they stand and fall together, and any great calamity like drought, which overwhelms the cultivators, involves the rural traders and artisans in the same ruin.

5. Hardly any of the district officers in their replies to this question have done more than copy in the census figures for their districts. Several, however, observe that the real number of agriculturists is considerably in excess of the recorded number; and Mr. Markham (Allahabad) and Mr. Harington (Unao) both adopt the view that after deducting the urban population, all, or almost all, the inhabitants of villages must be set down as agriculturists. The Superintendent of the Terai, in which district there is no town at all, considers the whole of his population to be agricultural.

6. There is another way in which a fairly good estimate of the agricultural population can be made. We know the area actually cultivated, and we can form a close approximation to the number of people who on an average are required to cultivate it. The agricultural statistics of the Province are not, unfortunately, so advanced as yet as to be able to supply information as to the number and classes of tenants in all districts of the North-Western Provinces; but in several of the settlement reports, the number of the different classes of tenants, and the area they occupy are recorded with much care, and these statistics afford a sounder basis for calculating the number of the population engaged in agriculture than the figures recorded in the census. The following table brings together in one view the information which is scattered through these reports:—

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DISTRICT.	CULTIVATING PROPRIETORS.		TENANTS WITH OCCUPANCY RIGHT.		TENANTS-AT-WILL.		TOTAL.		Average Area.
	Number.	Area.	Number.	Area.	Number.	Area.	Number.	Area.	
Saharanpur -	37,762	357,789	20,526	147,694	36,320	212,349	94,608	717,832	7.5
Bulandshahr -	14,206	166,541	22,717	220,662	56,596	412,542	93,519	799,745	8.5
Aligarh -	15,193	204,938	28,380	258,749	43,752	433,485	87,325	897,172	10.2
Bijnor -	20,916	102,517	37,851	278,331	46,030	209,958	104,797	550,806	5.8
Budaon -	—	—	102,226	501,212	64,064	190,871	166,290	692,083	4.1
Bareilly -	10,968	66,514	132,103	610,759	79,155	190,441	222,230	867,714	3.8
Shahjehanpur -	5,078	26,391	33,168	70,647	18,704	30,501	51,872	101,148	2.9
Mainpuri -	15,602	88,582	80,641	369,693	28,535	129,821	124,778	605,121	4.2
Farukhabad -	20,603	107,335	102,703	417,600	47,239	127,456	170,595	545,056	3.8
Etah -	13,531	99,184	71,459	379,651	32,859	129,732	117,849	619,329	4.9
Cawnpore -	—	—	—	—	—	—	199,857	799,428	4.
Fatehpur -	13,745	66,563	85,225	352,605	42,869	113,135	141,839	532,303	3.7
Jhansi -	—	—	3,697	31,736	2,699	13,495	6,396	45,231	7.
Azamgarh -	64,057	324,209	109,860	357,742	64,955	85,110	238,872	767,061	3.2
	231,661	1,610,563	830,554	3,997,082	563,777	2,278,896	1,847,928	8,580,727	4.64

From this it appears that in 14 districts comprising one-third of the area of the Province, 1,847,928 cultivators occupy 8,580,727 acres of cultivated land, or 4.64 acres apiece on an average. Assuming (as we fairly may) that the rest of the Province is cultivated by the same proportion of agriculturists, the total cultivated area, or 25,000,000 acres, would require about 5,400,000 cultivators. Each of these persons thus recorded on the land-roll of the Province is ordinarily the head of a family; and reckoning $4\frac{1}{2}$ as the average number of a family, they would represent a population of 24,000,000.

7. There are three sources of possible error in this calculation. On the one hand it is sometimes the case that when a tenant or a cultivating proprietor dies, his sons continue to hold the land tenanted or owned by the father jointly, and without separating; in this case the tenure is counted as a single number in the village record, and may thus represent three or four heads of families instead of one. On the other hand, where a man holds two parcels of lands in two different villages, he must be counted twice over, as a resident cultivator in one case, as a non-resident in the other. The tendency, however, of these causes will be to neutralise each other. The third source of error is where the same person cultivates both as a proprietor in his own land, and as a tenant in another person's land; and this is probably very common, and may account for the discrepancy* between the census and the settlement figures, which is much greater in

* Mr. Plowden, in paragraph 49 of his Report, discussed the reason why the census returns as to agriculturists disagree so much with the returns in the settlement reports. He compares the figures of three districts only. But the following table compares the two sets of figures in 13 districts:—

DISTRICT.	Census.			Settlement Report.		
	Proprietors.	Tenants.	Total.	Proprietors.	Tenants.	Total.
Saharanpur -	16,856	94,170	111,026	37,762	56,816	94,608
Bulandshahr -	7,299	141,269	148,568	14,206	79,313	93,519
Aligarh -	8,988	146,040	155,028	15,193	72,132	87,325
Mainpuri -	14,213	148,904	163,117	15,602	109,176	124,778
Farukhabad -	18,910	162,931	181,841	20,603	140,942	170,545
Etah -	9,487	134,559	144,046	13,531	105,318	117,849
Cawnpore -	—	—	203,100	—	—	199,857
Fatehpur -	7,823	115,892	123,715	13,745	128,804	141,839
Azamgarh -	65,571	267,194	332,765	64,057	174,812	238,872
Bareilly -	9,148	297,826	306,974	10,968	211,258	222,226
Bijnor -	4,586	99,630	104,216	20,916	83,881	104,797
Budaon -	11,216	193,381	204,597	16,855	166,290	183,145
Jhansi -	7,249	39,754	46,994	1,105	6,396	7,501
Total -	181,337	1,835,253	2,217,690	244,543	1,343,201	1,786,861

As the census returns include all males over 15, that is, one out of three, and the settlement returns as a rule show only the one head of the family or one out of four and a half, the former number ought to be 50 per cent. larger than the latter. In the case of tenants this proportion is fairly observed and the

case of proprietors than in the case of tenants. What the exact amount of deduction is that should be made on this account, it seems impossible to say. But the settlement reports indicate pretty clearly what quantity of people are required to till the land according to the existing system. In the Farukhabad district (where peculiar care was taken over these records, with the special object of elucidating the question which is being discussed here), it was estimated (on the data afforded by an inquiry into the registers of a large number of villages) that about half the non-resident cultivators held land also in the villages where they resided, and that making this deduction, the average area per family was 4.2 acres. The average area per family given by the table above compiled for all the 14 districts is 4.64 acres. It appears, therefore, probable that this average may safely be assumed for the Province, and that the total agricultural population may be put at 5,400,000 families, or 24,000,000 of people. This will include the large tenants who hold more land than they can till themselves, and are forced to employ labourers, as well as the small mixed tenants who follow other occupations and take up a patch of land to occupy their leisure hours. The field labourers are, if we may trust the census returns, $3\frac{1}{2}$ millions, or 830,000 families, leaving 4,570,000 families having rights in the land. It is probable, however, that the landed families are more numerous than these, and that many of the adult males classed as labourers are the younger sons of tenants.

8. In order to test this hypothesis, or rather in order to arrive independently at some fresh data for a sound hypothesis, a special census was taken at my request by the Collector of Cawnpore, Mr. Wright, in 22 agricultural villages of his district, with a total cultivated area of 10,000 acres, and a total population of 16,090 people. This is a denser population than the average, for, whereas the 25 million cultivated acres of the Province support 27 millions of rural population, or 1.1 persons per cultivated acre, here 10,000 cultivated acres support 16,990 villagers or $1\frac{1}{2}$ persons per cultivated acre. Among these it was found that there were the following classes:—

Agriculturists only—No.
Zemindars - - - 526
Tenants - - - 5,961
Labourers - - - 2,574

9,001 or 53 per cent.

two returns agree pretty well. But in the case of proprietors it is different. Moreover, there are many proprietors who do not cultivate at all: the census returns should show these and the settlement returns should not; so that the census number of proprietors ought to be still larger than the settlement number. But as a fact it is much smaller, and that in almost every district; it is possible that this is due to the fact that where a man is both proprietor and tenant, and is entered as such twice over in the settlement records, he is entered only as a tenant in the census returns.

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Mixed—
Tenants also following other trades - - - 4,152 or 24.5 per cent.
Non-agriculturists following trades only - 3,837 „ 22.5 „

If we may assume the same ratio to exist throughout the Province, we should come to the conclusion that half of those who are nominally non-agriculturists, and who practice some hereditary trade or profession, do also, over and above this, follow agriculture. At this rate the classification of the population would be—

	Adult males.	Total population.
Urban	1 million	3 millions.
Agriculturists, including labourers -	$7\frac{1}{4}$	$21\frac{1}{4}$ „
Those who follow agriculture, combined with trade or professions -	1	3 „
Those who follow trades and professions only -	1	3 „
	$10\frac{1}{4}$	$30\frac{1}{4}$ „

9. Two causes may have led to this mixture of trade and agriculture—one is land-hunger, eating into the trading classes and leading them to invest their surplus profits not in extending their trade but in the cultivation of land; the other is the unprofitableness of the hereditary trade, and the fact that being unable to make a living out of it, they are forced to fall back on the universal occupation which requires (as at present practised) little capital and no special knowledge, and which every inhabitant of Hindostan seems to take to as naturally as a bird to flying. The following statement showing the numbers of the more important occupations, will throw a little light on the matter: the first four columns show the people classified in the occupation statement of the census report:—

Class.	Order.	Name of order.	Trade or Profession.	Total number.	Number engaged in Agriculture also.
I. Professional.	3	Learned -	Priests -	331	206
			Doctors -	54	16
			Teachers -	84	82
II. Domestic.	5	Domestic service.	Sweepers -	62	22
			Washermen -	217	133
			Barbers -	405	212
			General service -	1,698	799
			Labourers -	564	261
III. Commercial.	5	Buying and selling, and lending money.	Money-lenders -	290	237
			Shop-keepers -	172	75
			Grain sellers -	258	210
			Cloth sellers -	25	12

DISTRICT.	NUMBERS.			TOTAL No.	AREA HELD BY			TOTAL AREA.	Average area per head.
	Proprietors.	Resident Tenants.	Non-resident Tenants.		Proprietors.	Resident Tenants.	Non-resident Tenants.		
Lucknow -	16,452	87,801	26,627	130,880	Acres. 58,995	Acres. 347,566	Acres. 73,713	Acres. 480,274	Acres. 3.67
Bara Banki -	6,751	99,496	35,783	142,030	89,296	375,286	69,711	534,293	3.76
Rai Bareilly -	10,530	87,631	23,624	121,785	65,387	290,037	72,930	428,354	3.51
Sultanpur -	19,734	171,072	57,305	248,111	83,935	333,236	88,349	505,520	2.04
Pertabgarh -	12,658	105,206	28,391	146,255	76,760	340,243	75,050	492,053	3.36
Gonda -	16,320	136,176	36,644	189,140	36,878	284,198	56,089	377,165	1.99
Baraich -	—	173,674	45,363	219,037	26,023	658,420	151,754	836,197	3.81
Sitapur -	—	104,760	53,705	158,465	—	585,562	193,434	778,996	4.91
Total -	82,445	965,816	307,442	1,355,703	437,274	3,214,548	781,030	4,432,852	3.27

This shows that 4,432,000 acres, or rather more than half the cultivated area is cultivated by 1,355,743 persons; hence it may be assumed that the whole area of the Province or 8,300,000 acres is cultivated by 2,500,000 persons, holding $3\frac{1}{4}$ acres a head. If all

these were separate families they would represent a population of about 11,000,000, or more than the whole rural population. It is clear, therefore, that in many cases the same person must hold more than one tenancy. Without a more minute knowledge of the

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system on which the record has been prepared, it is impossible to judge from these figures what the number of people engaged in agriculture is; but it is reasonable to suppose that the same ratio which held good in the North-Western Provinces will apply here, and that nine-tenths of the rural population, or about 9,000,000 out of 10,400,000, are engaged wholly or in part in agriculture. The population of the North-Western Provinces and Oudh may therefore be classified as follows:—

Population.	North-Western Provinces.	Oudh.	Grand Total.
Urban and non-agricultural.	3,000,000	800,000	3,800,000
Rural and following trades or professions alone.	3,000,000	1,200,000	4,200,000
Rural, and following trades or professions conjointly with agriculture.	3,000,000	1,200,000	4,200,000
Rural and following agriculture only.	21,750,000	8,000,000	29,750,000
Total - -	30,750,000	11,200,000	41,950,000

BENGAL.

Mr. Toynbee.

Such figures as can be given in answer to the first part of this question will be found in the accompanying statement.

No figured information bearing on the second part of the question is available for Bengal. It may be said generally that, with the exception of dwellers in towns, the proportion of the population which is absolutely landless is very small, especially in the great

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rice-growing tracts of Eastern Bengal. The proportion is larger in Central and Western Bengal, and is perhaps greatest in Behar, especially in the districts of Durbhunga and Mozufferpore, which are the most over-populated districts of that Province.

When the next census is taken, it will perhaps be possible to record such information as will be useful in future famines.

STATEMENT showing the POPULATION with reference to Agriculture and pressure on the Land. (CENSUS OF 1872.)

DIVISION.	District.	Total population.	Total male adult agricultural population.	Per-centage of male adult agriculturists on total population.	Number of souls to the square mile.	REMARKS.
BURDWAN	Burdwan	2,034,745	337,249	16.6	578	
	Bankoora	526,772	77,440	14.7	391	
	Beerbhoom	695,921	119,628	17.2	518	
	Midnapore	2,540,963	471,949	18.6	500	
	Hooghly with Howrah	1,488,556	192,976	13.0	1,045	
PRESIDENCY	24 Pergunnahs *	2,657,648	324,044	12.2	950	
	Nuddea	1,812,795	244,820	13.5	530	
	Jessore	2,075,021	427,020	20.6	567	
	Moorshedabad	1,353,626	189,804	13.3	526	
	Dinapore	1,501,924	362,352	24.1	364	
RAJSHAHYE	Maldah	676,426	102,710	15.2	373	
	Rajshahye	1,310,729	241,784	18.4	587	
	Rungpore	2,149,972	547,099	25.4	619	
	Bogra	689,467	170,057	24.7	459	
	Pubna	1,211,594	205,053	16.9	615	
COOCH BEHAR	Darjeeling	94,712	20,134	21.3	77	
	Jalpigoree	418,665	82,535	19.7	144	
	Dacca	1,852,993	296,819	16.0	640	
DACCA	Furzedpore	1,012,589	196,704	19.4	677	
	Backergunge	2,377,433	498,690	21.0	482	
	Mymensingh	2,349,917	507,899	21.6	378	
CHITTAGONG	Chittagong	1,127,402	158,273	14.0	451	
	Noakholly	713,934	127,780	17.9	458	
	Tipperah	1,533,931	314,500	20.5	578	
PATNA	Patna	1,559,638	212,529	13.6	742	
	Gya	1,949,750	264,306	13.5	413	
	Shahabad	1,723,974	270,959	15.7	393	
BHAGULPORE	Tirhoot †	4,384,706	973,299	22.1	691	
	Saran	2,063,860	427,810	20.6	778	
	Chumparun	1,440,815	342,822	23.7	408	
ORISSA	Monghyr	1,812,986	277,541	15.3	463	
	Bhagulpore	1,826,290	331,925	18.1	422	
	Purneah	1,714,795	278,863	16.2	346	
CHOTA NAGPORE	Sonthal Pergunnahs	1,259,287	205,977	16.3	229	
	Cuttack	1,494,784	212,248	14.2	470	
	Pooree	769,674	127,181	16.5	311	
CHOTA NAGPORE	Balasore	770,232	138,693	18.0	373	
	Hazareebagh	771,875	143,452	18.5	110	
	Lohardugga	1,237,123	236,624	19.1	102	
CHOTA NAGPORE	Singbhoom	415,023	74,666	18.0	92	
	Manbhoom	995,570	170,747	17.1	203	

* Including Calcutta.

† Now divided into two districts—Durbhunga and Mozufferpore.

CENTRAL PROVINCES.

The returns of the census taken early in 1872, show a total population of 8,201,519. The agricultural population is shown as 3,058,022. Males above 20 years 756,350, with a corresponding male agricultural population of 800,000 or thereabouts under 20 years of age.

The proportionate number of females of all ages belonging to the purely agricultural families which give the above 1,556,350 males of all ages would be very close on 1,500,000.

The classification of the agricultural male population gives—

Proprietary landholders	-	-	71,213
Absolute occupancy tenants	-	-	103,059
Occupancy tenants	-	-	211,843
Tenants-at-will	-	-	689,819
Ploughmen	-	-	168,601
Farm servants	-	-	259,546
„ labourers	-	-	63,900
Total	-	-	1,568,021

Probably the casual agricultural requirements at sowing, weeding, transplanting and harvest times will engage another 1½ million hands for full 10 weeks in the year.

Landholders who are chiefly dependent on the profits of trade or money lending have been excluded in these census returns of agriculturists. Also some

small portion of the occupancy tenants, such, for instance, as have petty holdings exclusively of kharif or of rabi land; in leisure times engage themselves as labourers for others, and more still resort to the carrying trade. The proportion of such persons among the tenants-at-will is much larger, but I have no statistics.

It is evident that among proprietary landholders and absolute occupancy tenants there will be under the laws of inheritance a considerable number of minors and of females. Among occupancy tenants, minors, and females would be fewer; the tenants-at-will would be nearly all or all adult males. The 168,601 ploughmen are no doubt all adult males, though often below 20 years of age. Among farm servants there would be very few women and no girls, but probably about half would be boys; the farm labourers would be mostly females.

The total of 1,568,021 would be the numbers of the purely agricultural classes who earn their own livings, and in addition support 1,490,001 members of their families, who cannot be classified as regular owners, holders, or workers.

The 1½ million of casual agricultural workers will embrace some portion of this 1,490,001 of the purely agricultural classes, together with a very large number of persons of all ages, and both sexes, whose general occupation is weaving, spinning, and the like.

BOMBAY.

The following table embodies the best information procurable on the subject, extracted from the census returns of 1872. It cannot be ascertained how many combine other occupations, and there seems reason to believe that different principles of dividing proprietors from tenants have been followed in different districts, as in some the Government occupancy ryots appear to be entered under proprietors, but in others only Khotes, Narwadars, and similar quasi-proprietors.

MALE ADULT CULTIVATORS, 1872.

Districts.	Total Male Adult Population.	Pro-prietors not culti-vating.	Pro-prietors culti-vating.	Te-nants.	La-bourers for Wages, whether paid in kind or money.	Total.
1. Khândesh	350,698	1,261	143,237	9,170	14,790	168,478
2. Nasik	245,481	1,997	100,408	7,713	6,924	117,102
3. Ahmednagar	278,462	4,716	114,948	3,687	22,381	145,732
4. Poona	311,173	6,237	126,494	2,568	14,481	149,780
Total	4,601,847	78,510	1,435,018	718,788	307,247	2,539,563

MADRAS.

Out of a total adult male population consisting of 9,660,973 persons, more than one-half, 4,878,890, are cultivators holding land either directly under Government or under zemindars. In addition to this great body of small farmers, there are upwards of two million adult males (2,071,602) classed as labourers, and Dr. Cornish, who compiled the census tables, states that probably more than three-fourths of these find employment in connexion with land.

Districts.	Number of Cul-tivators.	Number of La-bourers.	Number of Property Holders.	Total.
Ganjam	234,586	90,363	2,911	327,860
Vizagapatam	361,184	112,092	14,394	487,670
Godavari	267,789	96,867	23,401	388,057
Kistna	243,388	55,088	8,240	306,716
Nellore	200,360	118,249	5,732	324,341
Cuddapah	222,557	99,820	11,694	334,081
Bellary	273,828	94,952	3,056	371,836

Districts.	Number of Cul-tivators.	Number of La-bourers.	Number of Property Holders.	Total.
Kurnool	128,353	72,771	11,343	212,467
Madras	3,551	23,610	1,749	28,910
Chingleput	143,334	70,551	219	214,104
North Arcot	329,765	120,076	14,649	464,490
South Arcot	348,794	111,623	340	460,757
Tanjore	256,366	96,483	73,731	426,580
Trichinopoly	219,271	70,587	490	290,348
Madura	462,867	125,194	512	588,573
Tinnevely	222,462	104,936	374	327,772
Coimbatore	256,130	138,679	149	394,958
Nilgiri	6,963	3,930	71	10,964
Salem	336,327	118,206	1,768	456,301
South Canara	181,496	36,273	266	218,035
Malabar	179,519	311,242	1,491	492,252
Total	4,878,890	2,071,602	176,580	7,127,072

CHAP. I. QN. 8.

CENTRAL
PROVINCES.

Mr. Nicholls.

BOMBAY.

Mr. Peile.

MADRAS.

Board of
Revenue.

CHAP. I. QN. 8.

MADRAS.

Board of
Revenue.

The following statement shows the entire agricultural population for each district, i.e., the adult males together with women and children dependent on them for support, estimated on the assumption that the proportion of the number of adult females and children is the same for the agricultural population as for the total population of each district :—

Districts.	Population.	Number of Persons to a Square Mile.	Agricultural Population.	Percentage of Agricultural Population to Total Population.
Tinnevely -	1,693,959	327.3	1,058,312	62
Coimbatore -	1,763,274	237.3	1,297,653	74
Nilgiri -	49,501	66.0	29,885	60
Salem -	1,966,995	262.9	1,512,543	77
South Canara -	918,362	235.4	680,157	74
Malabar -	2,261,250	376.7	1,594,940	70
Total -	30,835,577	257.9	22,809,218	74

Ganjam (exclusive of Hill tracts).	1,388,976	534.6	1,087,115	78
Vizagapatam (exclusive of Hill tracts).	1,884,711	267.2	1,575,781	85
Godavari -	1,592,939	255.9	1,254,612	79
Kistna -	1,452,374	180.7	954,937	66
Nellore -	1,376,811	162.7	972,830	71
Cuddapah -	1,351,194	161.5	989,772	73
Bellary -	1,668,006	151.5	1,106,163	66
Kurnool -	959,640	130.4	646,279	67
Madras -	397,552	1472.1	83,284	21
Chingleput -	938,184	340.7	686,491	73
North Arcot -	2,015,278	282.3	1,473,708	73
South Arcot -	1,755,817	360.3	1,493,893	85
Tanjore -	1,973,731	540.1	1,407,999	71
Trichinopoly -	1,200,408	341.5	946,191	79
Madura -	2,266,615	238.5	1,956,673	86

The proportion of the population mainly dependent for support on agriculture to the entire population of the Presidency may thus be estimated at nearly three-fourths, and is certainly not less than two-thirds. No precise estimate can be made of the proportion of the agricultural population who live entirely on the profits of their cultivation. The number of cultivators shown in the first table attached to the question under reply shows that nearly half the population own lands, but it is difficult to say how far their income from their land is supplemented by earnings from other employments. The following table shows the number of registered ryotwar proprietors paying revenue to Government in each district for the year 1871-72 :—

STATEMENT showing the Rent Roll of Ryotwar Lands for Fasli 1281 (1871-72).

Districts.	RYOTS PAYING UPWARDS OF 1,000 RUPEES.		RYOTS PAYING FROM 500 TO 1,000 RUPEES.		RYOTS PAYING FROM 250 TO 500 RUPEES.		RYOTS PAYING FROM 100 TO 250 RUPEES.		RYOTS PAYING FROM 50 TO 100 RUPEES.		RYOTS PAYING FROM 30 TO 50 RUPEES.	
	Num- bers.	Assess- ment.	Num- bers.	Assess- ment.	Num- bers.	Assess- ment.	Num- bers.	Assess- ment.	Num- bers.	Assess- ment.	Num- bers.	Assess- ment.
1	2	3	4	5	6	7	8	9	10	11	12	13
1. Ganjam -	2	RS. 2,116	2	RS. 1,379	32	9,995	386	51,760	1,728	1,09,737	3,238	1,18,701
2. Vizagapatam -	—	—	3	1,961	30	9,783	251	36,308	754	51,663	757	29,614
3. Godavari -	22	28,697	112	72,589	548	1,83,204	3,731	5,57,526	6,496	4,49,944	6,962	2,74,506
4. Kistna -	1	1,490	22	14,287	239	74,616	2,831	3,84,151	8,940	6,00,199	12,700	4,79,394
5. Nellore -	7	10,220	44	36,488	205	49,255	1,525	1,81,079	3,907	2,73,072	6,196	2,06,366
6. Cuddapah -	—	—	1	503	46	13,991	612	82,250	2,724	1,81,257	6,211	2,18,966
7. Bellary -	1	2,018	16	9,974	107	33,396	1,571	2,14,178	5,528	3,66,403	9,572	3,60,696
8. Kurnool -	—	—	10	6,349	117	34,819	977	1,27,929	2,624	1,65,845	4,566	1,61,276
9. Madras -	—	—	—	—	—	—	—	—	—	—	—	—
10. Chingleput -	5	9,871	46	30,436	231	78,816	1,540	2,16,213	3,722	2,66,968	4,541	1,87,743
11. North Arcot -	—	—	5	3,321	40	12,637	526	70,230	2,460	1,59,434	5,446	1,95,264
12. South Arcot -	8	10,657	46	31,187	232	76,046	2,326	3,15,023	7,665	5,05,999	12,644	4,82,517
13. Tanjore -	205	5,19,778	655	4,48,492	1,730	6,01,062	5,872	9,01,678	9,364	6,58,369	11,334	4,32,701
14. Trichinopoly -	29	43,379	70	47,097	218	74,315	1,009	1,48,316	2,611	1,70,566	5,114	1,75,651
15. Madura -	2	2,137	12	9,414	69	22,324	722	98,926	2,676	1,77,069	5,333	1,96,648
16. Tinnevely -	65	1,11,112	148	99,104	591	2,01,156	2,961	4,34,324	5,928	4,12,219	8,377	3,01,943
17. Coimbatore -	2	3,517	13	8,778	75	23,962	570	80,196	2,026	1,34,063	4,218	1,53,428
18. Nilgiri -	—	—	1	611	2	540	18	2,660	17	224	25	857
19. Salem -	—	—	1	534	13	5,170	246	33,598	1,301	82,010	3,620	1,32,857
20. South Canara -	20	29,771	88	57,307	353	1,16,569	2,078	3,02,317	4,620	3,19,766	5,262	2,03,909
21. Malabar -	29	48,175	104	66,774	410	1,37,265	1,985	2,88,036	3,994	2,71,057	5,437	2,06,760
Total -	401	6,22,938	1,399	9,46,585	5,288	17,58,921	31,737	45,26,698	79,085	53,56,864	121,553	45,19,797

STATEMENT showing the Rent Roll of Ryotwar Lands for Fasli 1281 (1871-72)—continued.

Districts.	RYOTS PAYING FROM 10 TO 30 RUPEES.		UNDER 10 RUPEES.		TOTAL SINGLE PUTTAS.		JOINT PUTTAS.		GRAND TOTAL.	
	Num- bers.	Assess- ment.	Numbers.	Assess- ment.	Numbers.	Assess- ment.	Num- bers.	Assess- ment.	Num- bers.	Assess- ment.
	14	15	16	17	18	19	20	21	22	23
1. Ganjam -	11,169	RS. 1,93,175	17,477	64,709	34,034	5,51,572	3,720	1,15,138	37,754	6,66,710
2. Vizagapatam -	1,231	23,387	1,203	5,475	4,229	1,58,191	426	32,315	4,655	1,90,506
3. Godavari -	15,458	2,90,008	14,338	72,759	47,667	19,29,233	10,808	4,16,378	58,475	23,45,611
4. Kistna -	36,180	6,55,464	38,379	1,88,218	99,292	23,97,819	38,331	7,96,404	137,623	31,94,223
5. Nellore -	17,537	3,02,769	24,518	1,02,189	53,939	11,61,438	29,541	5,08,849	83,480	16,70,287
6. Cuddapah -	26,496	4,37,759	87,197	2,97,867	123,287	12,32,593	29,231	4,02,159	152,518	16,34,752
7. Bellary -	39,348	6,73,067	81,139	3,53,632	137,283	20,13,364	5,174	1,47,606	142,456	21,60,970
8. Kurnool -	17,773	3,04,755	41,600	1,65,008	67,667	9,65,981	17,923	2,83,126	85,590	12,49,107
9. Madras -	—	—	—	—	—	—	—	—	—	—
10. Chingleput -	12,151	2,24,937	23,060	94,518	45,296	11,09,502	9,799	4,06,209	55,095	15,15,711
11. North Arcot -	25,861	4,35,135	95,858	3,43,538	130,196	12,19,559	50,497	7,38,384	180,693	19,57,943
12. South Arcot -	54,182	9,25,230	155,099	5,87,728	232,202	29,34,387	42,421	5,35,982	274,623	34,70,363
13. Tanjore -	30,267	5,47,661	69,196	2,50,266	128,623	41,60,007	1,270	48,784	129,893	42,08,791
14. Trichinopoly -	23,245	3,53,066	98,400	2,85,522	130,696	12,97,912	8,536	1,29,688	139,232	14,27,604
15. Madura -	26,213	4,34,375	94,537	2,99,146	129,564	12,40,039	10,736	2,33,885	140,300	14,73,920
16. Tinnevely -	30,015	4,97,432	80,627	2,77,392	128,715	23,34,682	14,030	5,90,513	142,745	29,25,195
17. Coimbatore -	25,560	3,96,525	79,215	3,57,651	111,679	11,58,120	103,528	13,41,215	215,207	24,99,335
18. Nilgiri -	268	3,947	1,712	5,201	2,043	15,040	882	9,872	2,925	24,312
19. Salem -	31,767	4,82,840	103,055	3,98,000	140,003	11,35,009	66,012	7,26,972	236,015	18,61,981
20. South Canara -	10,141	1,91,090	15,403	54,767	37,965	12,75,496	—	—	37,965	12,75,496
21. Malabar -	20,854	3,53,537	129,737	3,59,316	162,550	17,30,920	2,270	35,854	164,820	17,66,774
Total -	455,716	77,26,159	1,251,750	45,62,902	1,946,929	3,00,20,864	445,135	74,99,333	2,392,064	3,75,20,197

CHAP. I. QN. 8.

MADRAS.

Board of
Revenue.

From the above statement it appears that there are in this Presidency nearly 2½ millions (2,392,064) of ryotwar proprietors. Persons who own lands in different taluks and even in different villages are registered more than once, but such cases are not very numerous and need not be taken into account in a rough calculation. Setting aside proprietors under joint puttass there are nearly two millions (1,946,929) of ryotwari proprietors, of whom a million and a quarter, or nearly 67½ per cent., pay less than Rs. 10 to Government, and nearly half a million (455,716) between Rs. 10 and Rs. 30. It seems certain that none of the former and only a portion of the latter can subsist solely on the profits of their cultivation; and, as the state of things is probably not very different as regards Zamindari and Inam lands or amongst tenants in ryotwari districts, the Board think it may safely be said that three-fourths of the peasant proprietors and small farmers of the Presidency (say 3¼ millions) work as agricultural labourers for others or follow non-agricultural occupations.

It is not easy to determine the proportion that follow non-agricultural occupations. The census tables show amongst the cultivators—

Brahmans -	-	-	132,443
Kshatriyas -	-	-	42,092
Chetties (traders) -	-	-	43,772
Shepherds -	-	-	332,380
Artisans -	-	-	24,624
Accountants -	-	-	11,840
Weavers -	-	-	33,271
Potters -	-	-	16,846
Fishermen -	-	-	152,714
Toddy drawers -	-	-	173,484
Barbers -	-	-	16,422
Washermen -	-	-	18,990

Total - 998,878

For the reasons given above it may be assumed that of these about three-quarters of a million are not supported solely by the cultivation of their own land, and it may also be assumed that by preference they

would follow the specific occupation of their caste, rather than work as field labourers. This, however, it would not always be possible for them to do, as, for instance, in the case of the 51,704 fishermen in the inland district of Bellary, and it will probably suffice if half a million is deducted from the 3¼ millions given above on account of non-agricultural occupations. If to the remaining 3¼ millions be added the two million labourers who hold no land of their own there is a total of 5¼ millions out of little more than seven million adult male agriculturists, and assuming the proportion of women and children to be equal throughout, it may be said that about 75 per cent. of the entire agricultural population of the Presidency are supported wholly or in part by field labour for others.

With regard to the expression "field labour for others" the Board desire to explain that they have considered it to be applicable within the meaning of the question to the common practice on the part of small proprietors of cultivating land owned by others on a kind of temporary tenancy, retaining a share of the produce as their remuneration.

NOTE BY SECRETARY.—The Board's conclusion may be summed up thus :—

That out of five millions of "the landed," representing, say, a population of 16,000,000, there are—

1¼ million males (say four million population) who live by land entirely.

½ million males (say 1½ million population) who live also by trades.

3¼ million males (say 10 million population) who live partly by labour for others.

Total 5 millions.

Besides two million males, or 6¼ millions population, who live solely or mainly by labour for others.

Leaving 2½ million males, or eight millions population who live in other ways and are landless.

Of the 5 millions 2½ millions are ryots on Government land.

Add - 1 million tenants under them.

" - ½ junior members of families.

Balance 1 million ryots on Zamindari lands.

CENTRAL INDIA.

CENTRAL
INDIA.

Mr. Wingate.

The information is scanty. In Bhopal five-eighths of the population are said to be agricultural, and of these one-eighth live entirely by land and one-fourth entirely by field labour. In the Mánpur pergunna there are 585 regular agriculturists; of these 94 live by land only, 341 partly by land, and 150 are field labourers. For Baghelkhand, Lieut.-Col. Bannerman says:—

"I can only estimate this roughly, but it is supposed that two-thirds of the entire population may be considered agricultural, of which probably half are

directly engaged in the cultivation of the soil and half derive their chief income from the land. These latter do not personally engage in cultivating the land, for the custom in Baghelkhand is that the 'Brahmins,' 'Chuttees,' 'Jhaloors,' 'Bais,' never touch the plough, and the land is cultivated by 'Sudras,' such as 'Kachees,' 'Kumbis,' 'Kols,' and 'Gonds.' Of the latter a few live by the profits of the lands cultivated by themselves, but the majority are entertained in service on various terms by the classes above mentioned."

HYDERABAD.

Moulvie Mahdi
Ali.

HYDERABAD.

In the absence of proper census returns, no correct and complete reply to this question can be given. Efforts were however made to collect all possible information on the subject that could be gathered by

causing the census of a number of villages to be taken in several districts.

The following statement embodies the result of the information thus collected:—

Number.		DISTRICT.	Per cent., with regard to the total population of the villages under inquiry.							
			Khotedars* who depend solely on the cultivation of their soil.	Khotedars* who are engaged in cultivation, to- gether with other occupa- tion.	Shikmi- dars (Sub- tenants).	Total of Tenants.	La- bours solely engaged in field labour.	Labourers in part supporting themselves with field labour.	Total of Field Labourers.	Grand Total of Agricultural Population.
1	2	3	4	5	6	7	8	9	10	11
1	Telingana.	Medak - - -	34.27	12.70	3.62	50.59	8.73	11.01	19.74	70.33
2		Sirpur Tandur - -	30.59	18.77	13.70	63.06	6.07	9.12	15.19	78.25
3		Khammam - - -	35.54	18.41	11.67	65.62	9.86	11.07	20.93	86.55
4		Yelgandal - - -	41.74	15.13	11.12	67.99	8.77	9.19	17.96	85.95
		Average of Telingana	35.53	16.25	10.03	61.81	8.36	10.09	18.45	80.27
5	Maharashtra.	Aurangabad - -	38.52	2.65	13.28	54.45	7.10	5.21	12.31	66.76
6		Bid - - -	41.83	11.38	13.66	66.87	4.26	5.61	9.87	76.74
7		Raichor - - -	39.80	8.63	5.07	53.50	5.97	12.31	18.28	71.78
8		Shorapur - - -	36.66	4.03	12.68	53.37	3.01	20.56	23.57	76.94
		Average of Maharashtra	39.20	6.67	11.17	57.05	5.08	10.92	16.007	73.05
		Average per-centage of each Province	37.37	11.46	10.60	59.43	6.72	10.51	17.23	76.66

* i.e., holders of land on leases direct from Government.

These figures have reference only to the class of persons who are directly engaged in the cultivation of the soil, or support themselves wholly or in part by field labour for others. Those remaining are that class who, without personally conducting agricultural operations, derive their chief income from the land. These are the jagirdars and maktadars, who, like zamindars, lease out their lands to cultivators and receive certain fixed amounts in return. Having regard to these figures and various other circumstances, the proportion of the agricultural population may be estimated at 75 per cent. for the Maharashtra country, and 80 per cent. for the Telingana. Of this proportion about 62 per cent. live entirely by the profits of the cultivation of their own land, and nearly

18 per cent. support themselves wholly or in part by field labour for others, in the Telingana country; and in the Maharashtra country, these may be set down at 58 and 17 per cent. respectively. These figures are based on the returns of the special census taken by the talukdars in certain villages. This census was taken only in villages containing a purely agricultural population, and in no case in *kusbas* and towns. Hence the per-centage of the agricultural population is somewhat high. But with respect to the country at large, it may be assumed that the agricultural population in the Telingana country amounts to about 70 per cent., and in the Maharashtra country to about 65 per cent.

CHAPTER I.—QUESTION 9.

PUNJAB.

Mr.

Maconachie.

Delhi.

What is the ordinary economic condition of the portion of the agricultural population directly engaged in the cultivation of the land and possessing any proprietary or occupancy interest in land? Illustrate your reply by giving the actual facts as to a few typical instances of such persons taken from four or five different villages in several districts of your Province. State, with regard to each, what area of land he holds for tillage or grazing, what his family consists of, what amount of food-grain and what value of other produce he raises on an average off his land in a year, what rent or revenue or cesses he pays for his land, what expenses he incurs in hired labour (other than his own labour and that of his family), what amount he spends in a year in purchases of necessaries, which he cannot produce on his land, what kind of house he lives in, how many rooms it possesses, and how many out-houses, what quantity of cattle or other live-stock he possesses, what other property, and what stock of grain. How does he dispose of any surplus income, whether by hoarding or lending his money, or investing it in ornaments, or spending it on marriage ceremonies, or otherwise? What are his debts, and to what are they commonly due? State what proportion of the agriculturists of your district you believe to be in debt, and what proportion their average indebtedness bears to their average yearly income. Endeavour to obtain the opinions on these points of well informed and trustworthy native residents of different districts, and in submitting such opinions explain the position of your informants, and the probable means at their command of forming correct conclusions.

PUNJAB.

The instances examined by me are nineteen in number, as follows:—

Proprietors - - - 7
Tenants with occupancy right - 7
Tenants-at-will - - - 5

The proprietors are men of different parts of the district, chosen as living in different assessment circles, and thus as being as regards soil and irrigation at least in different circumstances. The first in style of living probably, though not really the best off, is the proprietor of land in a canal village. The instance given (No. 6) is that of a man somewhat below the average, the fact being that the village where he lives has suffered from "shor." Twenty years ago the canal villages were in the height of prosperity, pakka houses were built, the common funds of the proprietors often raised a substantial travellers' house used as a village assembly room (the *chaupair* or *chaupál*). The oxen, fed on sugar-cane stalks, gur, and the abundant fodder of canal irrigated fields, increased in size and strength; the people themselves adopted a more luxurious style of living and dress. But this prosperity has waned; the crops are not what they were, the soil is enfeebled, and in many places destroyed, at least for the time. The people, however, do not easily come back to their primitive simplicity, and the consequence is that there is in the canal irrigated district a far greater amount of indebtedness than there would have been had the old circumstances of expenditure been unaltered. Still, where the canal has been used, and not abused, there is yet even a prosperity not equalled anywhere in the district. The realignment of the Jumna canal will probably keep this prosperity for many villages, but a safer and simpler means of abating the evil lies in the restriction of canal irrigation and by keeping the main channel dry for some months in the year to allow the spring level to sink again. Much has been written, and something is now being done, about the improvement of the drainage, but it were well to prevent as well as to cure. The holding of the canal proprietor is not generally larger than the ordinary size throughout the district, 12 to 15 acres, but he gets richer crops, especially sugar-cane, off the ground. In a large canal village it is not uncommon to find a mass of cultivation of this crop, sometimes 50, 75, or 100 acres standing together, with regularly marked narrow lanes well fenced in leading from one end to the other. Sugar-cane is expensive alike for seed, planting, care while growing, and expressing when ripe. But it well repays the cost, and is in fact the great stand-by in those villages where it is grown. Sugar-cane is grown rarely in the *khádir* chak and in some villages in the *bángar*, but nowhere does it come to such a size as in the canal villages.

The other chaks have proprietors for the most part in moderate circumstances. The Kohi chak probably (see No. 14) is the poorest, and there the people are

sometimes very low in their standard of living. The houses are mere chappars of thatch; sometimes mud walls support the thatch; the food consists mainly of the inferior grains, and the dress often is only a piece of dirty coarse cotton cloth in the form of a "chádár." The general average, however, is better than this. No. 1, it is true, is in debt, but his style of living is something like comfort, and it is because he has a large family for his moderate holding that he becomes embarrassed. Had he fewer mouths to feed, he might be as well off as the shrewd Ját No. 4, who, in a holding of only seven acres, has managed to save money, and knows how to use it when saved. No. 9, though under a temporary cloud, may perhaps get right again; in an ordinary year he probably pays his way. His house is not much certainly, but it is better than the Kohi Gujar. If it were not for the cows of the latter, he would hardly manage to live.

The general condition, then, of the proprietor may be described as moderately prosperous; there is little margin for him to fall back on in bad times, and his style of living is somewhat low, but in ordinary years and with ordinary expenses, he generally pays his way. A marriage, a funeral, or bad luck with his cattle, may bring him into difficulties; but these, too, he may extricate himself from in many cases. There is reason to believe that legal fees are in a few instances the cause of embarrassment, if not of ruin.

The tenants with occupancy rights, and still more the tenants-at-will, might perhaps be supposed, as being inferior in station, to be inferior in circumstances also to the proprietor. This, however, is not always the case. The tenant with occupancy has sometimes (as in case No. 2) an auxiliary income from "parohitái," priestly dues, which enables him not only to pay his way but save money. In the case in question this auxiliary income becomes most important. The number of such privileged persons is necessarily limited, but without such adventitious aid the tenant is often a man of substance. Whether he will remain so is a matter of doubt. Up to the present time he generally pays only the revenue-rate of the village on his land, i.e., he pays no rent, so that, provided his holding is of a fair size, he may be as well off as the proprietor of other land in the same village. There seems little doubt, however, that when the new assessments shall be announced, a general attempt will be made on the part of the proprietors to obtain rent, or an enhancement of rent, and this must lessen the profits of the tenant.

The position of the tenant-at-will is very unequal. He, too, at present often pays only the revenue-rate, but on the other hand he sometimes has to give a competition rent. The pressure of population is felt more directly here than in any other class. A family of strong men, or having active women, may do well, but whenever the non-producing part of the house becomes

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Delhi.

large, distress is sure to follow. The mālī of Rathdhaneh (instance No. 3) gets together, in one way or another, a pretty large income, but the large quantity of food requisite to keep his 17 people going makes it a hard matter to keep out of debt. Probably by the time the boys come to working age, they will find their earnings embarrassed with considerable debt. The limit, however, is not far off; when the money-lender ceases to give credit, the house breaks up, and the men scatter to earn their living by hiring themselves out. The difference in status arising from advantages of irrigation is shown in instance No. 8, where a tenant-at-will on 17 acres contrives to pay a "revenue" of Rs. 62 odd, and Rs. 40 more "water-rent." The "revenue" of course includes rent paid to the proprietor. With this heavy charge on him, he yet pays his way, and is on the whole in comfortable circumstances. This being so, it is no wonder that the proprietors expect to be well off, and are disappointed when they find their former prosperity gone.

I forbear to dwell on details at any length, for I am sure that my experience is not sufficient to give exact estimates, and these I imagine are the only useful things of their kind. The instances I have collected speak for themselves, and are, I believe, as valuable and trustworthy as they are interesting. I would draw attention to the various ways in which the income from direct cultivation of the land is eked out by auxiliary means.

- (1.) The proprietor in Rathdhaneh (No. 1) makes Rs. 54 by ghī sold; the tenant-at-will in the same village (No. 3) Rs. 24; (No. 4) a proprietor, makes Rs. 36; the same amount comes to the Gujar proprietor (No. 14).
- (2.) Brahmani dues are great helps to No. 2 and No. 7, who are both tenants with occupancy, while for No. 16, the Brahman tenant-at-will in the Kohi chak, they constitute half his income.
- (3.) Money-lending is possible only in the case of profitable farming, but this is not uncommon. It obtains only where the men are shrewd and thrifty. In fact, seeing how some Jāts amass capital, and prosper as usurers, one is inclined to think that differences of soil are less important than differences in mental and moral habits.
- (4.) Lāmbardār's dues are a help, but a small one, and the social habits engendered by possession of the dignity are more than a counterbalance to the income thus obtained.
- (5.) Selling cow-dung is a help in some parts, especially near towns, in the case of the khadir tenant-at-will (No. 19); this with grass sold brings in Rs. 2 a month.
- (6.) Letting out gāris on hire brings in something, Rs. 12 to No. 1, and often there is more than this; chiefly however, near towns.
- (7.) The last item is hire for labour, which, of course, when regularly pursued, is fairly lucrative for an able-bodied man. The earnings of boys in the Kohi chak as herdsmen seem noticeable.

I pass on to the last matter on which report is required. The causes of indebtedness are not generally obscure; in order of importance they may generally be put as follows:—

1. Expenses of marriages and funerals.

2. Vicissitudes of season, as regards crops.
3. Ill-luck with cattle, or personal illness.
4. Severity of Government revenue.

All these matters have often been dwelt on, and I am not likely to strike out anything new. The question of sumptuary laws will probably be considered; perhaps, too, the idea of a rough assurance association to afford compensation in cases of death of cattle is not original. Both matters seem to me worthy of consideration. But I think it better to pass on to the last point—indebtedness caused by the severity of Government revenue. I think this uncommon, but I believe it exists, and more than anywhere else in the canal villages. Some of these have been paying Rs. 3 on every cultivated acre for the last thirty years. Now this may be borne in fair years, though it is a great burden, and forces on a system of cultivation which cannot but injure the land. But in bad years, or when water is scarce or not given at the right time, the canal village is worse off than any. The canal irrigation, at the style in which it has been going on here for many years past, would, I believe, ruin any land in time. It is of no use to say that the people are to blame for flooding their land so; their reply is cogent; we must do so to sustain the heavy Government demand. The inelasticity, too, of the canal water-rent is against them, so that, as a matter of fact, canal irrigation, which should be the most certain protection of a high average, and of that average from wide variations, often introduces an element of speculation into the matter, which would at first sight seem astonishing. The inference to be drawn seems to be that Government has not properly discharged its duties as joint trustee of the land with the Zamindārs. If they have not discretion sufficient to prevent a far distant but surely coming destruction of the powers of the soil by a moderate use of the immense power of irrigation from canals, that duty and that responsibility, nevertheless, remain with Government. The remedy is simple; allow only moderate irrigation, and assess accordingly. Severity of revenue in other than canal villages is rare. The Government demand is inelastic, and we have failed to teach the people as yet to prevent the strain in bad years by forethought and thrift in good seasons. But the adjustment is generally accomplished, though in a clumsy and costly manner. The money-lender gives help in bad seasons, and is repaid in good; the greater cost is found in his exorbitant interest. If we push this further, we find that the "middleman" class is numerous; that it is favoured by superior intelligence and social custom. And this brings us to what perhaps is not the greatest cause of indebtedness strictly speaking, but the greatest cause of increase of indebtedness, viz., the power of the bania and money-lender over the Zamindār. The subject is a well worn one, and it seems unnecessary to do more than, having noted the distinction above, to record my assent to the general opinion.

This reply is of course not exhaustive. It has been written rapidly, but as it deals with matters which must form in a great measure the intellectual pabulum of officers whose work lies chiefly among Zamindārs, the substance of it has been formed and corrected by daily experience.

turist himself is incapable of making anything but a very rough guess at the amount he has actually spent during the past year; and here again the fluctuations are so great, and depend so much on motives difficult to analyse, that it is well nigh impossible to strike a satisfactory average.

Present condition of district abnormal.—It seems necessary to note that the condition disclosed by the 5th and 6th columns of the accompanying statement (giving a description of the agriculturist's house, cattle and chattels, and the amount of his debts) is not to be taken as the normal condition of the agricultural community in the Gurgaon district. The kharif crop of 1877 was almost a total failure, and the rabi of 1878

was much below the average, so that all but the most well-to-do agriculturists have lost a large number of their cattle, and have been obliged to part with all their luxuries, and not a few of their necessities, and to increase their debts. The inspection of their houses was made just before the threshing of the present kharif crop, so that the quantity of grain found in stock was very small: indeed many were then living on handfuls of the ripening grain gathered from their fields. It is to be feared that this kharif and the ensuing rabi will not enable those who have become indebted during the scarcity of the past year to recover their former position, and will barely suffice to prevent them from sinking deeper in the quicksand.

No general description possible.—In a district such as this, containing such a variety of soil and caste, and even climate, it is necessary to divide the agricultural community into classes, and describe their circumstances in some detail; no general description of their ordinary economic condition would apply to the whole community with any approximation to exactness.

Factors in the economic condition of the agriculturists.—The circumstances which determine the condition of an agriculturist come, in order of importance, as follows:—

1. *Caste.*—As a general rule, whatever be the nature of the soil he cultivates, or the incidence of the revenue he pays, the caste of the agriculturist, which determines his habits and customs and natural disposition, will determine his economic condition. At the head of the prevalent castes in this district I would place the Ahirs, as the most industrious, thrifty, and prudent; though much of the land occupied by them is of an inferior description, and the incidence of the revenue in Rewāri tahsil, where most of the villages are owned by them, has for 30 years been very high, as compared with the rest of the district, they have, by unremitting toil, compelled the soil to yield them a wonderful amount of produce, and have by prudent thrift kept themselves and their lands free from debt. Next to them come the Jāts, who own many villages in the east and north-east of the district. Their land is very fertile; and in Palwal tahsil, where they form the chief portion of the land-owning class, the incidence of the revenue has been hitherto extremely light. In industry and thrift they are inferior to the Ahirs, though superior to other castes; while on the whole very well-to-do, they have not been careful to keep themselves free from debt and their land from mortgage. After them come the Rajputs, owning land chiefly in the centre of the district, and the Brahmans, scattered here and there, but neither caste forming a very important element in the agricultural population. Last of all on the list come the comparatively lazy and superlatively unthrifty Meos, who own some 350 villages in the two southernmost tahsils of the district (Nuh and Ferozpur). Without the excuse of a barren soil or an excessive revenue, they live so closely up to their income, are so negligent in developing the resources of their land, and indulge so in unwarranted expenditure, that the failure of one harvest plunges them irretrievably into debt. Last year's scarcity found many of them still burdened with debt contracted in the famines of 1860-61 and 1868-69, and has left them with 17 per cent. of their land heavily mortgaged, and much floating debt hanging over them besides.

2. *The number of the family.*—Other things being equal, the lucky man who has few children has less difficulty in making ends meet. When the children are young they make more mouths to feed without any corresponding increase in the number of hands to work, and even when they become old enough to help in the fields, the cost of their food is greater than would be the hire of labourers to give the same amount of work at the most pressing times. Each child too must be married, and marriages are the great extravagance of the agriculturist's family; even where one

contracting party exacts a sum of money from the other, the expenses of the ceremony are sure to exceed the income. The greater the number of births, the greater will be the number of deaths in the family, and each funeral too is an expensive affair; the brotherhood and the poor must be luxuriously and extravagantly feasted. There was a time not many years ago when the agriculturist who had a number of sons and daughters to help him to break up new land was likely to better his condition; but now throughout the greater part of the district the population has overtaken the land, and hired labour is cheap. Happy is the man whose quiver is not too full. As might be expected, the unthrifty Meos are famous for the number of their children.

3. *Subdivision of the land.*—This is closely connected with the last head. Where the family is a large one, the family holding is, on the death of the head, sometimes worked in common by the sons, but very frequently divided between them in equal shares. The practice of separating off distinctly the different shares of the land is encouraged by our revenue and law system, and is rapidly becoming more common; and as the increase of a holding by the death of a brother or uncle without heirs is much less common than its subdivision among the sons of the deceased proprietor, this practice leads to the rapid increase of small holdings, the produce of which is barely sufficient to supply the necessities of life to the agriculturist and his family; and while the heads of families in the village community are gradually becoming more distinct in their individual rights and responsibilities, they have not yet learned to co-operate in the modern sense of the word. There is thus little to fall back on when a season of misfortune comes. The extent of subdivision is generally much influenced by the tenure of the village. Where the village is held in bhayāchāra tenure, as is usual among the Jāts and Meos, the land is much subdivided, and where the tenure is pattidāri, as it often is among the Ahirs, the owners of a share in the village often hold and cultivate it in common, and can thus meet misfortune better than if they had to fight it single-handed.

4. *Facility of irrigation.*—The introduction of the Agra canal into the eastern part of the district has vastly improved the condition of the agriculturists in that tract by increasing the productiveness of their land in much greater proportion than it increases the cost of production, but most of all by protecting them against seasons of drought—the great source of indebtedness and poverty. Although irrigation from the canal commenced only some four years ago, its good effects are already seen, and it is to be hoped that the standard of comfort of the Jāt agriculturists benefiting therefrom will be decidedly raised before the population overtakes the increase of produce; provided, however, that their prosperity does not make them lazy, and that the proximity of the canal does not permanently enervate them, as seems to have been the case with the Jāt landholders on the Western Jumna canal. There seems some danger of the latter calamity, for this year in particular fever has literally devastated the tract through which the canal passes; some villages have in a few months lost one-sixth of their population, and scarcely a man is to be found who has not been greatly reduced in strength by repeated attacks. But if this proves to have been an exceptional year, as there is some reason to hope, the great diminution of the population may even prove a blessing to the survivors.

The facility of well irrigation is also an important factor, as on this depends the protection of the land from drought; but it must be taken advantage of. The Ahirs work their deep wells, night and day: the Meos often do not take the trouble to sink them when water is near.

5. *Nature of the soil.*—This factor, which at first sight seems most important, really comes low down in the list. The sandy soil of Rewāri produces enough to keep the thrifty Ahirs in comfort, while the comparatively rich soil of the Ferozpur valley is heavily

Mr. Wilson.

Gurgaon.

Difficulty of satisfactory calculation.—From the instances I was myself able to collect and from comparison of those given by the different superintendents, I find that it is indeed extremely difficult to give with anything like exactness a detail of the income and expenditure of an ordinary agriculturist. The area of the holding and the amount of revenue and cesses or rent payable thereon can be given exactly, but the amount and value of the produce is subject to very great fluctuation year by year, according to the nature of the seasons. Still more difficult is it to calculate even the average expenditure of the family, for no account is kept except of the few things obtained on credit from the village shop-keeper, and the agricul-

CHAP. I. QN. 9. mortgaged to meet the extravagances of the thriftless Meos.

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6. *Incidence of the revenue.*—This too is of less importance than would at first sight seem probable. The Ahir landowners of tahsil Rewari, hitherto notoriously heavily assessed, are much less indebted than the lightly assessed Meos of Firozpur, and less even than the much more lightly assessed Jats of Palwal, thrifty though the latter are said to be.

7. *Status of the agriculturist.*—There is much less difference between the condition of the owner of land, tenant with right of occupancy, and tenant-at-will, throughout the greater part of the district than would be expected. The vast majority of tenants with rights of occupancy, and a very large number of tenants-at-will, have hitherto held their land on condition of paying simply the revenue and cesses due thereon, and they have generally shared on equal terms with the owners in the common rights of the village. However, since the operations of the present settlement began, and more especially since the new assessments were announced last year, the tendency to distinguish more sharply between these classes of agriculturists has been rapidly growing. Tenants-at-will are called on to pay higher rents, or are ejected from land they have held for years on these favourable terms. Suits are instituted to have defined more exactly the rights of occupancy tenants and to enhance their rents. Property in land is becoming more valuable every day, and the rights of owners having been more clearly defined in the new settlement records, money-lenders are willing to advance larger sums than before on the security of land. Thus it is generally remarked that tenants-at-will have greater difficulty in borrowing than owners or even than tenants with occupancy rights. All these tendencies may be expected to develop with remarkable rapidity in the few years following the close of the present settlement operations.

8. *General condition of the people.*—The general condition of the agricultural population then may be said to be painfully dependent on the seasons; all their income comes from the land. Where a landowner, besides the actual produce of his own separate holding, can count among his income the proceeds of hiring his cart between the busy times or those of the sale of his ghi, he finds that in a year of drought even these are apt to fail him, for the difficulty of feeding his oxen and his buffaloes swallows up all the income they bring; and where a cultivator ekes out the produce of his fields by his dues as a village menial or family priest, he finds the villagers in seasons of scarcity unable to pay him the full fee. The Jats of Palwal are now greatly protected against drought, but are in some danger of increasing their expenditure too fast, and losing some of their old industry and thrift; but they may be generally described as well off, especially the landowners. They can easily stand a year of scarcity, and will probably soon recover themselves, though even they are, like all agriculturists, apt to neglect payment of the principal, and even of the interest of a debt once contracted, and often carelessly allow the sum noted against them in the village money-lender's

Alimulla.
Rohtak.

Being appointed superintendent of tahsil Rohtak in 1873, I have had to gain acquaintance with this tahsil when testing measurement work, and when testing attestation papers of the people who used to come before me. I beg to lay before you the condition, &c. of tenants and owners of certain villages of tahsil Rohtak with which I am acquainted since 1873.

The ordinary economic condition of the agricultural population engaged in the cultivation of land is, that their sole means of livelihood is the income derived from cultivation of land on which they are engaged. Some of the owners also go into service, and some of the tenants work at trades.

3rd Division.—The reply of this and that of the above para. could not be given satisfactorily in detail in

books to grow and grow until they can have little hope of paying it off, the wily banker knowing it to be his interest not to press for ready payment, but to encourage his debtor deeper into the toils, until he has him completely at his mercy. When this is so with men having such advantages as the Jats of Palwal, what must it be with the Meos. Their condition is rapidly becoming hopeless. They live solitarily from hand to mouth, carelessly contracting debt for marriages, funerals, and petty luxuries, even in average years, that when a year of drought comes they are thrown on the money-lender, who can make with them what terms he likes. During the past 15 months some 5 per cent. of the cultivated area of the two Meo tahsils of Nuh and Firozpur has been mortgaged, and now 17 per cent. of the total cultivated area is so burdened that there is little hope of its ever being redeemed. The Meo landowners are rapidly becoming practically reduced into the position of tenants. Their condition loudly calls for special consideration, though it is difficult to see what can be done for them. During the past year a large amount of revenue due from them has been suspended, but they have had to borrow for food and the evil has only been reduced, not removed. Not a few who had no land to mortgage left the district to seek a means of livelihood elsewhere until better times. It is pleasant to turn from this state of things to that of the Ahirs in Rewari. With all their disadvantages, their industry reduces the evils of a year of drought to a minimum, and their thrift supplies them with a means of tidying over it, and reduces their expenditure for the time. Though the drought of last year was as bad with them as anywhere, they paid their revenue, and that without contracting a larger amount of debt than they are likely to clear off in a year or two of favourable harvest, should they be fortunate enough to have them.

9. *Causes of indebtedness.*—The causes of debt are: (1) general extravagance, which leads to debt even in ordinary years; (2) marriages and funerals, the expenditure on which is enormously disproportionate to the income; (3) drought, which finds the agriculturist without any surplus saved, and kills his cattle and compels him to borrow to pay the revenue and support his family; (4) neglect to pay the interest on debts already contracted, which rapidly multiply themselves.

10. *Estimate of indebtedness.*—Taking the district as a whole I should estimate the extent of indebtedness as follows (but the estimate is worth very little):

Class.	Proportion of class indebted.	Average amount of indebtedness on gross annual income.
Owners -	Five-eighths -	Two years' gross income.
Tenants with right of occupancy.	Five-eighths -	Two years' gross income.
Tenants-at-will -	One-half -	One year's gross income.

The proportion is abnormally high, owing to the late scarcity.

words, so I have given it in tabulated forms, showing all kinds of income and expenditure of agricultural population of the above named villages, whether owners, occupancy tenants, or tenants-at-will. In these forms the condition of people of average circumstances cultivating unirrigated land is given

The following is the difference between a tenant and an owner:—

1. The owners as compared with the tenants can command more credit in every matter connected with their welfare.

2. An owner can sell or mortgage his land in time of need; while a tenant has no power to do so, for tenants falling under section 5 of the Punjab Tenancy Act are only very few in this tahsil.

3. An owner keeps with him all income derived from his land after paying Government revenue and cesses; while a tenant has to pay *malikana* in addition to land-revenue and cesses.

4. The owners are in good circumstances as compared with the tenants.

5. An occupancy tenant cannot be ejected without any good ground of his neglecting his duties, &c., but a tenant-at-will can be ejected at the expiry of a term of period for which he was entertained. This difference is clear to every one.*

The tenants in this tahsil are village servants, such as blacksmiths, carpenters, chamars and potters, who in addition to agriculture pursue their own trades, and their holdings are usually small. Where Jats are tenants, they do nothing besides agriculture. Some of the Jat tenants of Kalanaur are entered as tenants.

The timely fall of rain is the only hope of progress and prosperity in the *barani* villages of the tahsil, on which occasion a cultivator repays his debts of seasons of drought. On the failure of timely rains for two successive harvests he is obliged to have recourse to borrowing, as the surplus of the previous year is never sufficient to support for so long.

No land is kept for grazing the cattle. The *shamilat* land or land kept for next crop in which spontaneous grass springs up, is used by cattle for grazing. Green mustard is sown mixed with the rabi crops, and cut and mixed with dry joar and bhusa for cattle in some months of the year in the rabi; and green "chari" and grass is cut to feed the cattle in kharif.

The following are the reasons of the indebtedness of the agriculturist:—

a. When an old member of a Hindu family dies, a ceremony is performed involving an expenditure of Rs. 100 at the least. The average cost

is Rs. 500, and in extreme cases it reaches Rs. 1,000.

b. A son's marriage among Hindus. In such cases on an average Rs. 400 are required, to pay to the bride's father; until this sum is paid, the marriage is not allowed to take place.

c. In this tahsil the holdings of the owners are small; and the owners are never free of dealings with the village bankers. The entire produce of a harvest is consequently usually made over by the owner to his banker. And what the owners need for their food and expenses, and seed and Government revenue, they take in kind and cash from the banker. The banker of course takes care that the produce paid to him is credited at cheap rates, and that what he advances to the agriculturist is charged at dear rates. The accounts are settled up at each harvest; interest due being treated as principal in the next account.

d. The seasons of drought here are very common in every third or fourth year; when it occurs there is little produce or no produce at all; so a cultivator has to borrow for his livelihood, and it often occurs that in such year his cattle die, and he is obliged to ask his trader for a loan to pay revenue and buy bullocks for field. Such are the conditions, and the above are the reasons of the cultivators being in debt, as shown in the illustrative cases appended.

6. There is no custom of *batái* in this tahsil; the tenants pay rent in cash.

* *Note.*—The proprietors themselves cultivate the land here, and among them the "Jat" tribe is the most numerous and most industrious. The next to him are Hindu and Muhammadan Rajputs, who are also cultivators of average degree. The others are miscellaneous tribes of lower respectability and less prosperous.

1. The district to which these replies refer is the district of Hoshiarpur, which lies in the Jullundur Doab between the Sutlej and the Beas. The northern half consists of hilly country comprising the two outer ranges of the Siwaliks, and the *Juswán Dún*, which lies between these ranges. The southern half of the district is plain country, generally of great fertility, and covered with mango groves, but intersected by numerous sandy beds of torrents sometimes extending to half a mile in breadth. The *Juswán Dún* is generally fertile. There are low-lying alluvial tracts on the banks of the Beas and Sutlej which are subject to destructive inundations.

I have been Deputy Commissioner of Hoshiarpur district for nearly three years, and have been over the district repeatedly in every direction.

2. The ordinary economic condition of the agricultural population is not uniform.

The large landowners are well-to-do, and some are even wealthy. These, however, are few in number. The average landowner who cultivates 10 to 15 acres, the occupancy tenants, tenants-at-will, all live from hand to mouth, and the majority are in debt. In the Hoshiarpur Parganah it is calculated that one quarter of the agriculturists have hypothecated or alienated their land; about one-fifth are well off, and have something in reserve; while about one-fifth are free from the pressure of debt, though not able to save.

In this district occupancy tenants are frequently, it would seem, as well or better off than the neighbouring owners. This applies to the plain portions of the district. The owners are often Rajputs, and from pride of caste or some other reason do not cultivate with their own hands. The occupancy tenants are as a class more industrious cultivators than the owners; in virtue of their inferior social position they have less temptation to extravagance; and they cannot raise money with the same facility as the owners, for their interest in the soil does not form so valuable a security.

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Further, in the plain parts of the district, the owner's share is so small—8 to 12 per cent.—as not materially to effect his position where he is compared with the occupancy tenant.

At the same time I should mention that in some tracts, for instance about Una, the occupancy tenants are very badly off. Their share of the produce is allotted in kind; and except in very good years the amount they take seems hardly enough to support their families. They take $\frac{2}{10}$ or $\frac{3}{10}$, while the owners get $\frac{4}{10}$ or $\frac{5}{10}$.

The tenant-at-will is uniformly a poor creature living from hand to mouth. He has a little credit, and therefore his debts are not so large as those of the other classes.

It may be asked why, when the value of produce has so much increased, the agricultural community have not generally been able to better their position and to accumulate wealth. The reason is that generally the produce raised on a holding is not much more than sufficient, if it is even sufficient, to support the family of the cultivator. It is only the larger owners who cultivate extensive holdings who have a surplus for sale. And as (in most part of the district probably) the owner's share is a very small proportion of the produce, it is only the very large owners in tracts where the tenants are hereditary as a rule, who make a substantial income out of their proprietary rights.

Proportion of agriculturists who are in debt.—Of those whom I have consulted on these points, tahsildars and intelligent landowners, no one has suggested any less proportion of indebted persons than 33 per cent., and only one has put it so low.

In the Dasuya Parganah the tahsildar estimates the proportion at 75 per cent., while a very intelligent *zaildar* has put it down at 90 or 95 per cent.

According to the inquiries I have made, it seems probable that about 70 per cent. of the proprietors throughout the district are in debt.

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The same proportion in the case of tenants of both classes is slightly smaller, and may be put down at about 66 per cent.

These results are, I believe, close to the truth. Causes of indebtedness of agriculturists.—In the case of owners, I believe one great cause of indebtedness is the sudden command of money which the stability of the tenure of land conferred some 20 or 25 years ago, leading to laziness on the one hand and social extravagance on the other.

Social ceremonies, as more money income became available, and the economic use of it had not yet been learned, increased in expensiveness. I believe the next generation or that part of it which still finds itself owner of its ancestral acres (for some land has changed and is changing hands) will have learned a lesson and be more careful.

As regards occupancy tenants, one cause of their indebtedness in the Una Parganah is that their share of the produce is small, and hardly sufficient to serve as a sufficient maintenance.

There are certain other circumstances which embarrass all classes of cultivators, and bring them into debt, or prevent their getting out of it.

1. Increased price of bullocks and other necessities which the cultivators must buy.
2. The short period of limitation for parole and bond debts. This law enforces too frequent rests in running accounts, and thus gives opportunity for piling up compound interest very rapidly.
3. High rate of interest charged by bankers. There appears to me no remedy for this.
4. Large quantities of land have in this district been yearly destroyed by sand deposited from the hill torrents. Special measures have been suggested to remedy this.

Proportion of average indebtedness to average yearly income.—This is a difficult question to answer. As far as I have been able to judge from opinions recorded, I think the average indebtedness of owners and tenants is a sum equal to three years' income.

The economic condition of agriculturists of all classes is illustrated by the typical instances detailed in the annexed statement, in which actual facts have been recorded.

P.S.—The following additional remarks on the same subject received from Mr. Coldstream, in another communication, will here find a suitable place.

I believe that the majority, i.e., considerably more than half of the agriculturists of this district, are in debt.

I have had occasion to make particular inquiries into the subject in connexion with a proposal for remission of revenue (in 1876-77), in the villages of the Bet, or alluvial land bordering the Beas in the Dasuya Parganah, and took occasion to have statistics compiled with some degree of accuracy.

61 villages or about one-tenth of the Parganah then formed the subject of inquiry; of these villages only two were found to be not indebted. The other 58 villages owed Rs. 2,64,682 to their bankers, or on an average Rs. 4,563 per village; while the average jama is Rs. 466 per village; that is to say, they owed on an average nearly 10 years' jama, or nearly half the average selling price of the (assessed) land of their

Mr. Hawkins.
Amritsar.

So far as I am aware, there is no material difference in welfare between the three classes of "owners," "occupancy tenants," and "tenants-at-will." This may seem improbable, but it may be explained that good tenants are seldom evicted, and that both classes of tenants practically hold much the same position.

Their economic condition is, I believe, good, if comparison be made with any similar class of peasant proprietors in European countries. One point is, perhaps, specially worthy of notice, that the Zamindar has since annexation increased his material comforts and

villages. The details of this enormous mass of debt were as follows :—

	Secured on Mortgage of Land.	Cash Debts Un- secured.	Total.
Owners - - -	70,964	1,47,596	2,18,560
Tenants with rights of oc- cupancy - - -	9,256	36,866	46,122
	80,220	1,84,462	2,64,682

The debts in nine of these 58 villages exceeded 20 years' jama: and in 22 villages the debts equalled or exceeded 10 years' jama.

It is not that the land is highly assessed. In only 22 of them does it exceed Rs. 2 per acre: while the land is good and bears fine crops of wheat and rice.

I formed the opinion that the cause of this state of indebtedness is the relation in which they stand to their bankers on the one hand, and, on the other, the natural improvidence and carelessness of their character, and their extravagant social habits. They are nearly all Jat Rajputs and Gujar Muhammadans.

Twenty years ago they found out the value of their land, and that they were able to raise large sums on its security. They forthwith proceeded to enjoy the pleasures of a command of cash. They had now the temptation to borrow for a daughter's marriage, and again (e.g., in Sambat 1913) when a bad season came, were driven to a loan. Once into the banker's toils they were not able to escape.

Their apathy and ignorance made them an easy prey to the astute bania, whose accounts they could neither read nor understand.

Afraid to demand an acknowledgment or receipt for any payment, even when they understood the value of such a document, they get credit loans and make payments in kind for a series of years till all recollection of individual transactions has faded from their memories, and then they have to give a bond bearing heavy interest or go into court.

My own opinion is that the next generation would be somewhat better able and willing to take care of themselves: but the question is, will another generation see them the owners of the soil? In many cases it certainly will not. Land has already to some extent changed hands. When the harvest is ready, the bania proceeds to the threshing floor, and the grain is laden on the carts of the Zamindars and borne off to the granaries in the town. All is taken except a few months' supply for the needs of the cultivators and their families. This very grain they are forced to take back again at a valuation perhaps 50 per cent. higher than that at which they parted with it.

Thus they go on living from hand to mouth on the edge of starvation, and hardly anticipating the time which appears to be drawing near for many of them, when their proprietary rights will cease to exist even in name.

This state of matters is to be found in a good many villages of Dasuya tahsil. The description is not applicable to the district generally, but it represents a state of matters not at all uncommon throughout the district.

possessions considerably, and apparently this progress still continues: it is by no means unusual now to hear of a Zamindar combining a little money-lending with his agriculture, or able to add to his land by purchase or mortgage. The average dress is better; more ornaments and cattle are kept.

The agricultural population has never much capital, but that this class in the Punjab is not quite without capital is shown by the fact that they have tided over at least three bad years on their own resources, without further help than occasional remissions of revenue.

The last three years would have gone far to break a good many tenant farmers in England.

As a rule the agriculturist is somewhat in debt, but this appears to be the normal condition of the peasant proprietor in all countries. The money-lender is a power in Ireland, France, or Germany. But as a rule also I should be inclined to think that the agriculturist is solvent, i.e., his estate would pay 20s. in the pound. Foreclosure of mortgage is the real ruin of the peasant proprietor, but this is not peculiar to the Punjab; how many estates in England are clear?

As to the proportion of debts to income or of insolvents to the whole population, I could give no answer but a guess. The agriculturist will probably over-state his debts in view of future taxes: the money-lender would over-state them for fear they should be afterwards cut down. The indebtedness is certain to be exaggerated. Even in England the local banks only could furnish similar statistics of any value, and the information could hardly be demanded from them.

The debts of the agriculturist are due to various causes: marriage ceremonies will generally be the reply given to a question on the point. Purchase of

The total number of agriculturists in the district is :—

Tenants-at-will - -	57,223
Occupancy tenants - -	23,875
Total tenants - -	81,098
Landowners - - -	385,996
Total - - -	467,094

And it is estimated that their aggregate debts average :—

	Rs.
Per owner - - -	2 9 0
Per tenant - - -	1 14 0

These debts are, in every instance, owed to the Hindu bankers and village traders.

The bulk of the land of this district is cultivated by the owners themselves. It is estimated that not more than 13 per cent. of the land is cultivated by tenants, whether occupancy or tenants-at-will; and of the two classes of tenants those at will are more numerous than those having a right of occupancy.

It is estimated that 80 per cent. of the owners, 20 per cent. of the occupancy tenants, and 10 per cent. of the tenants-at-will are indebted.

It is further estimated that the average indebtedness of the owners is about 30 per cent. on their average yearly income; while the average indebtedness of the occupancy tenants, similarly calculated, is estimated at 12 per cent. and that of the tenants-at-will at 5 per cent.

Rai Gopal Das enumerates 10 causes to which he attributes the greater indebtedness of the owners of land during recent years. The first six of these may be comprised under the general expression "personal extravagance." The seventh is "frequent attendance

As regards the economic condition of the agriculturists of these districts there is no very broad distinction between the condition of owners, occupancy tenants, and tenants-at-will. For the first 10 years after annexation the condition of all classes improved greatly; the harvests were nearly always good; cultivation was increasing; they bought milch cattle and jewels, and fed and clothed themselves much better than they had previously done. By-and-by the crops began to become poorer on the new lands, and some

cattle or advances of seed-grain are, I believe, really the most common cause of debt, and my experience in tracing the origin of book debts and bonds has been somewhat large. It often appears that the original debt, which was merely a small balance due to the general shop of the village, has swollen like a snowball in the course of a generation; a fresh bond for principal and interest being made out every two or three years.

The illustrations given in reply to the third question may give some idea of proportion when collected for the entire province; the figures given below are too few for any generalisation.

The accompanying instances have been taken quite at random with no view of illustrating any particular theory. I trust that they approach correctness, but would remark that the produce of the land is almost impossible to estimate, unless real farming accounts are kept, and is probably under-stated. Also, as noted above, the amount of debt is probably exaggerated; still the value of the property in cattle, and brass vessels, &c. will, in most cases, meet the debt, if the value of the cattle be only taken at Rs. 10 per head.

Of the total number of agriculturists three-fourths are in debt and one-fourth free of debt, able to pay their revenue from their own funds and selling their grain produce themselves. Prior to the two last bad years more of the people were free of debt.

The usual rate of interest is a very heavy one, two or three per cent. per mensem; and the frequent balancing of accounts, necessitated by the present law, causes debts to increase very rapidly by compound interest, and drives people to sell their lands. Both lenders and borrowers agree that in former days there was not so much compound interest charged, and that, no matter how old the account, it was usual to restrict the gross interest charged to 50 per cent. of the principal.

at court." The eighth "rapid growth of interest and compound interest through the working of the limitation laws." The ninth "rise in price of agricultural cattle." The tenth appears to be a general observation to the effect that owners of land now regard themselves as able to dispose of the fee simple of their estates, which formerly was not the case; and on the other hand the money-lending classes have now become eager to obtain possession of land.

The land owners of this district are not, I think, so indebted as those of many others. In enumerating the causes of agricultural indebtedness I would certainly add "the inequality and want of elasticity of our revenue system" to those above detailed, and I am inclined to think that the eighth cause in the above list (which reflects on the law of limitation) might be modified so as to designate "inadequate and indiscriminating judicial investigation, caused partly by over refinement in legislation, undue size of districts, and "over-work of the district staff."

bad seasons occurred. The leases of the first settlements ran out, and the agriculturists were called on to pay revenue on the lands newly cultivated. It also became difficult for them to keep cattle, for they had cultivated their own waste lands and the larger wastes had been formed into Government preserves. So the owners gradually got into debt, and the occupancy tenants. The tenants-at-will, who pay a share of the produce, pilfer a good deal from the crop before it is divided; and they are commonly village craftsmen

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Mr. Hawkins.
Amritsar.

Muhammad
Hayat Khan.
Gardaspur.

Mr. Tolbort.
Gujranwala.

Mirza Azim
Beg.
Jhelum.

CHAP. I. QN. 9. adding by their trade earnings to the receipts from their land. The average condition of agriculturists in the three districts of which I am writing may be taken to be as follows:—

Details.		Hazára.	Jhelum.	Gujrat.
Area of holdings in acres	Cultivated	7	11	5
	Grazing land	24	16	5
Total		31	27	10
Souls per house		5	4	3
Income per annum, Rs.	By articles of food	50	53	40
	Other sources	14	12	20
Total		64	65	60
Expenditure per annum, Rs.	Revenue and cesses	Rs. a. p. 7 14 6	Rs. a. p. 10 12 3	Rs. a. p. 8 11 9
	Wages	—	1 8 0	2 0 0
	Purchase of necessaries, not produced on his land	2 0 0	3 0 0	3 0 0
	Total	9 14 6	15 4 3	13 11 9
Nature of house and value		Rs. Kacha, 10 to 50	Rs. Kacha, 20 to 70	Rs. Kacha, 20 to 60
Rooms	For dwelling	1	1	1
	For cattle	1	2	1
Cattle	Kine	4	4	3
	Sheep and goat	3	3	1
Jewels, value, Rs.		20	35	40
Chattels, „		10	15	20
Cash, Rs.		20	—	—

The agriculturists do not usually store grain in their houses; they give it all at harvest time to the village traders. In the northern part of the Hazára district there is a custom by which at every harvest the village banker takes from the agriculturist as interest an *odi* (four sers) of grain for every rupee owed to him. If an agriculturist cannot pay this interest the cash value of the grain due is reckoned and added to the account. Cases sometimes occur in which, by this custom, all a man's harvest is swallowed up in interest.

In the same way most of the agriculturists of all three districts are in debt; perhaps 25 per cent. are free, not more. Of those in debt about one-third owe as much as one year's income, and this proportion is steadily increasing.

To test the matter I examined the accounts of 23 families in 14 different villages, and found that, whereas they only held land assessed at Rs. 368 per annum, they owed Rs. 3,182, of which Rs. 1,283 was admittedly interest; and of the balance, Rs. 1,899, it is difficult to say how much is really principal and how much old interest; but so far as I can ascertain only one-third of this, Rs. 1,899, is principal, and the rest is all accumulated interest. The men who owe this possess jewels, value Rs. 972, and goods and chattels, value Rs. 334, and their land besides.

Examining nine other villages I found that of 347 agricultural holdings 164 were free of debt; 97 owe sums not exceeding 10 times their annual assessment; 65 owe more than that, but less than 30 times the annual assessment; and 21 more than 30 times the annual assessment. The total annual assessment of these nine villages is Rs. 4,226, and their total debts are Rs. 32,454. The real reason of these debts is originally the extravagance of the Zamindárs, and subsequently heavy charges of interest. The accounts are opened with items of all descriptions, from pay-

ments of revenue to common expenses; but the real reason of the debts is as above stated.

In Jhelum it is the custom to charge two annas in the rupee for lending money, thus where a bond is given for Rs. 100 the debtor has only received Rs. 87 8; and then he is charged on the said Rs. 100 interest at two annas per rupee (12½ per cent.) per harvest, the unpaid interest being added at each harvest to the principal. At this rate in three years' time the debtor's account shows Rs. 227 13 0 due, though the sum actually borrowed was only Rs. 87 8 0. Thus he has been charged Rs. 140 5 0 interest. If the debt runs on in the same way for three years more its total will then stand at Rs. 460 11 0.

The old custom was not to balance the account every harvest, but only when the Zamindár wished to settle it or other special occasion arose; and for the oldest account not more than 50 per cent. was charged as interest if cash was paid, or 100 per cent. if settled by paying in grain or cattle.

Moreover, both debtors and creditors are equally careless; the debtor in borrowing and the creditor in lending. A cultivator with a small holding used not to be able to borrow more than Rs. 20; now he can borrow Rs. 100 or 200; or rather the sum he originally borrowed was small, and the debt has increased by interest. The creditor bides his time, and when he sees the debtor can pay will press him in our courts. Another reason is this: the land will sell for a large sum; for instance, in the case of the 23 families owing Rs. 3,182 above mentioned, they own 327 acres of land, which if sold would, at the rates now obtainable for land, Rs. 84 per acre, fetch Rs. 27,599. In former days land could not be sold at all; but it should be remembered that if much land were offered for sale such high prices would soon fail.

area cultivated by tenants is 13 acres. Both proprietors and tenants have an area for grazing, which is practically unlimited.

Proportion of owners in debt. Ratio of debts to yearly income.—Both proprietors and tenants live in what is literally a hand-to-mouth way. Each harvest

barely suffices for the wants of the half year, and is almost always forestalled by borrowing. In regard to their economic state and habits, the agricultural classes naturally group themselves into Muhammadans and Hindus; the Muhammadans being five times the number of the Hindus. Of the Muhammadan proprietors 70 per cent. are in debt. Of the Hindu proprietors 30 per cent. are in debt. It is very difficult to estimate what proportion the average indebtedness of the proprietors bears to the average yearly income. The lowest estimate in the materials before me says that the amount borrowed yearly is equal to 30 per cent. of the yearly income of the indebted proprietors. The highest estimate gives the debts as 80 per cent. of the yearly income.

Proportion of Tenants in debt, and ratio of debts to yearly income.—Of Muhammadan tenants 40 per cent. and of Hindu tenants 20 per cent. are in debt. The yearly debts of the tenants are equal to 20 per cent. of their yearly income.

Cause of the difference between the indebtedness of Hindus and Muhammadans.—The cause of the difference between the numbers of the indebted among Muhammadans and Hindus respectively is to be found in the difference of the habits of each class. Muhammadans are mostly spendthrift and improvident. The Hindus are the reverse. Muhammadans are nearly always uneducated; Hindus are always more or less educated. Hindus usually avoid acts that would bring them within the reach of the criminal law, while Muhammadans supply almost the whole criminal population, and so incur the expenses which follow from being suspected by the police and being prosecuted. Muhammadans have only one source of income, viz., agriculture. Hindus who own and cultivate land almost always combine money-lending and trade with agriculture. Hindus acquire land as payment for debts, Muhammadans generally borrow money to buy land.

Causes of indebtedness.—The causes of indebtedness are common to owners and tenants, and may be divided into two classes:—

Physical causes arising from the special natural features of the district.

The action of the agriculturists.

Physical causes.—The rain-fall is so small that no crop will ripen from rain alone. Agriculture depends on the rising of the rivers and the inundation canals assisted by wells; excessive floods as well as failure in the regular rising of the river are ruinous to the agriculturist. Insufficient or irregular supply of water in the canals is a fruitful source of debt. The canals of this district have been very much neglected since British rule. In one tahsil the indebtedness is distinctly to be traced to this cause. Most of the debts date from 1869 and the subsequent years. From 1869 to 1875 the canals were not properly cleared, and consequently did not fill in the proper season, ran irregularly, and stopped flowing early.

Habits of the People. Bad farming.—But the chief cause of the indebtedness lies in the habits of the people. They are very careless and lazy farmers; I do not suppose that the farming is very good anywhere in the Punjab, but the bad farming in this district at once attracts the notice of the native officials who come from the eastern and northern parts of the Punjab, and is a constant subject of remarks.

The agriculturists are wasteful in harvesting the crops and in preparing their indigo and sugar, and are careless in disposing of their produce, especially in not looking out for the best prices and in not retaining a stock for food and seed.

It is an almost universal institution that shopkeepers should take the whole of the Government share of the crop and pay the cash revenue for the agriculturist. The Government share fixed by custom is one-third or one-fourth of the crop, and often is as high as one-half. The cash revenue is equal to about one-eighth. The large profits made by the shopkeeper on a transaction of this kind are evident.

They neglect their bullocks, do not clothe them in winter and under-feed them; when a bullock comes from work, an armful of uncut and unwashed turnips is thrown before him. The bullock's teeth and lips grasp the round turnips with difficulty. It takes a long time for him to get a meal, and when it is eaten he has taken in a quantity of earth which was clinging to the turnips. The consequence is that the bullocks are very soon worn out, and as the district does not breed its own bullocks they have to be imported at a great cost.

Extravagance.—The agriculturists are very extravagant. They spend sums beyond their means at marriages, betrothals, circumcisions, and funerals. They pay constant visits to shrines and places of pilgrimages, and make offerings there which they can not afford. This part of the Punjab is overrun by religious impostors of different kinds, and the agriculturists make them presents out of all proportion to their incomes, and vie with one another in the largeness of their gifts.

Persons who cannot afford to do so keep saddle horses. Large sums are spent on women, lawfully and unlawfully.

Debt the cause of debt.—One great cause of debt is debt. The crops have generally been forestalled. When they are harvested, the creditors carry off the whole, and the agriculturist has to begin again borrowing for his daily wants, and he borrows under very disadvantageous circumstances. In the Alipur tahsil, when cash is borrowed, 2½ annas is deducted as interest and *chilkána*, and after a year a balance is one-half is added to the balance. Thus if a person struck and borrows Rs. 20, the loan is entered as Rs. 23 2 0, and if nothing is paid during the year, Rs. 11 9 0 is added to it, and the debt is brought forward into next year accounts as Rs. 34 11 0.

There is a ruinous practice called *bhanauti* in practice, which can best be described by an instance which came to my knowledge this year. A. borrowed money in December—January to pay the kharif instalment of land revenue, promising to repay the loan in June—July in grain at the rate of a path* of wheat for every Rs. 32 borrowed.

The usual price of a "path" of wheat in June—July is Rs. 55. In the year in question the market price was Rs. 85. I have known instances of rich agriculturists who had money in their houses forestalling the wheat crop by *bhanauti* in order to pay the kharif instalment of land revenue, rather than pay money out of their houses because they thought it unlucky.

Improvidence.—It is not bad farming or extravagance alone so much as improvidence that makes the agriculturists indebted. It is contrary to their habits to keep ready money by them. If a man makes a few hundred rupees more than his expenses, he will not keep any part of it for a bad year. He at once buys more land or more bullocks, or ornaments, or a wife. He will do anything rather than keep the cash. If then there is a bad harvest next year, he must go to the money-lender. No agriculturist ever has a balance to the good with his banker. Every one works with a balance to the bad and trusts to the harvest to put him right. The money-lending class is well able to take advantage of the extravagance and improvidence of the cultivating class. There is a local proverb in use among the former on the wisdom of keeping the latter in debt, i.e.,—*Jat té phat badha chagné*,—"An agriculturist, like a wound, is better when bound."

Cause of the bad farming, extravagance, and improvidence.—There can be no doubt that the continued bad farming, extravagance, and improvidence of the agricultural classes has produced the present state of indebtedness. But if we go further and ask what caused the bad farming, extravagance, and improvidence, the answer is that the people were never trained for the position in which they were placed by our Government, and were never fit for such a position.

* A measure of grain equal in weight to about 32 maunds.

Occupancy and non-occupancy tenants.—No material difference in welfare exists between tenants with occupancy rights and tenants-at-will in this district.

Average area owned and cultivated.—The average area owned by proprietors is five acres. The average

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Mr. O'Brien.

Muzaffargarh.

Under former Governments they were kept as regards agriculture in a state of tutelage. They were quite unaccustomed to manage for themselves. The Government kardárs did every thing for them, made them cultivate the land, made the Hindus lend them money and seed, and made the borrowers repay. The agriculturists were pitted against one another to cultivate. If one man did not cultivate his land, it was taken from him and given to another who would cultivate. After annexation this minute superintendence was withdrawn. The agriculturists were introduced for the first time to the name and responsibilities of proprietorship, and a system was introduced which enjoined the exact contrary. "Don't interfere with the distribution of the assessment or the internal management of the villages; the people do this much better themselves," was the order. The agriculturists who had for generations been accustomed to have every part of their economic details done for them by Government officials were as helpless as a child, which can hardly walk when deprived of the

chair on which it leaned, and the money-lender stepped into the place which the former Governments occupied. This I believe to be the true origin of the indebtedness in this district, and the neglect of the canals did the rest.

The indebtedness in this district is greater than in any district with which I am acquainted. I beg to append some very true remarks of Mr. Lyall's on the subject, which he made when reviewing the assessment report of the Alipur tahsil.

I have the honour to forward a statement in the prescribed form showing the actual economic facts regarding fifteen individuals of the agricultural class selected from different villages in each of the three tahsils. The items of expenditure are, I think, very correct, for they were first ascertained from the individual himself, and then checked by the shopkeeper who received his crop when grown, supplied him with necessaries, and lent him money. The income is, I am afraid, understated.

Mr. J. B. Lyall.

Extract from report by MR. J. B. LYALL, Settlement Commissioner, December, 1877.

Sale and Mortgages ; character of the Landholders.—There is nothing alarming, in my opinion, in the return of land sold and mortgaged since 1861. The price per acre looks very low in Bet Indus and Cháhi Sailáb, but the proportion of waste sold in these circles is large, which may account for part of the difference. There is, however, no doubt that the value of land in these circles is exceptionally low, and the table of average price per rupee of Government demand for land sold in 1873-76 proves the fact. It will be observed notwithstanding that the tahsil as a whole compares favourably with Sánnáwán in respect to selling price of land. I quite agree with Mr. O'Brien's remarks as to the indebtedness of the agriculturists and the faults in their character which are its main cause. The same faults are attributed generally to the Mu-

hammadan landholders of all this southern corner of the Punjab, but they are found in this tahsíl in a very exaggerated form. The heavy floods and the fever which follows have something to do with it. The almost universal prosperity of the Kirár landholders is proof that there is nothing crushing in the general pitch of the assessment. But as the Biloches, Syads, and Ját say, it would be folly to expect them to alter their characters and habits and rival the thrift and frugality of the Kirárs. These Kirárs are the Jews of the country, and have a special natural aptitude for earning and saving money. The general character of the agriculturists must be considered in assessing, but from what I have seen here and in Multan and Dera Gházi Khan I do not believe that a very light assessment would tend to get them out of debt.

Mr. Thorburn.

Bannu.

I answer question about economic condition of the peasant by enclosing a copy of the paragraph on the subject written some time ago for the final report. I may add that some of my superintendents think I have represented the condition of the ordinary peasant proprietor too favourably. They think there is greater real indebtedness.

I send the statement filled in as required.

Extract from Final Report on the Bannu Settlement.

§ *General condition of the Cultivating and Landlord Classes.*—The large majority of the landowning classes are self-cultivating peasants of small means and frugal habits. With two important exceptions they are all fairly prosperous, and in infinitely easier circumstances than they were 30 years ago. Taking a family to consist of a man, his wife and two young children, the annual cost of living to an ordinary peasant proprietor ranges from Rs. 70 in Marwat to Rs. 110 in Bannu proper: It is lower amongst the Marwats than elsewhere, because of their extreme poverty, and the fewness of home-produced consumable articles enforce great simplicity in diet, and a close economy in every other branch of domestic expenditure, especially clothing. It is highest amongst the Bannuchis, because every man's holding produces a large variety of consumable articles, and the exhausting nature of the climate requires them to live well. The Bannuchi frequently indulges in meat and ghi; the Marwat seldom sees either, except at great festivals or rejoicings on the two Eid days and at a marriage. Every peasant has a running account with his bania and borrows money as a matter of course to defray marriage or burial expenses and at times to pay his revenue. When he has sold or eaten the last of his own reserved store of grain—a frequent occurrence, about a month before the next crop is ripe, or when that crop fails, he bor-

rows food grain from [the] bania and returns up to double after harvest. Still in canal-irrigated parts, or sailāba lands, and elsewhere in fair average years, there is no general real indebtedness, and from Rs. 20 to Rs. 50 will represent the average amount to a man's debit two or three months after the harvest has been ingathered and the revenue paid. Most peasants live up to their means, and except in the shape of bangles never have any capital in hand. When a man has a good balance, he either redeems a mortgage or invests it in land, or buries it. Money saved in this latter way is generally referred to as treasure (khazāna); savings are hardly ever invested in cattle. So far I have spoken of the ordinary peasant; but with two exceptions. They are the Marwats of the poor sandy tracts, the larger half of Marwat, and those of the Bannuchis, whose holdings are so minute as to give the owners a bare subsistence. With both the struggle for existence is terrible, when anything occurs to increase expenditure or reduce income, and numbers drop down every unfavourable year into the position of tenants or of labourers. With the former, once a debt of the class known as gharah (neck) is incurred, it is pretty certain that in a few years the debtor must sell his land. This pernicious gharah system of securing a loan dates from some 20 years back. Under it the debtor either engages to pay as interest a certain portion of his earnings, and thus makes himself the quasi-bondsman of his creditor, or a certain measure of grain each harvest, crop or no crop. The usual rate is a topah of grain, i.e., about five sers per rupee lent, hence this species of debt is known as topah in pāi. The sum of gharah debts in Marwat was in 1875 considerably over half a lakh of rupees, but now I believe it is less. The indebtedness of a large proportion of the Marwats is due I think chiefly to over-assessment and the rigidity of our revenue system, but there is also no doubt that without any assessment at all in bad

years or cycles, debts would be incurred, and some old peasant proprietors would have to sell or mortgage their holdings. In this settlement the over-assessed villages have received substantial reduction, but Government still owes them reparation for the great injury of having for the 22 preceding years rack-rented them, so to say; and as the rigid revenue system remains, the district officer is under an obligation to work the rules sanctioned for suspensions and remissions with a wise liberality. In the other exceptional case, that of the owners of the minutest of the minute Bannuchi holdings, Government neither can nor ought to do anything. The assessment is fair, and a crop being a certainty, our system is elastic enough. The cause of the smallness of the holding is over-population, and for that the State is not called upon to find a remedy. Besides the Bannuchis are such a poor hybrid race as to be of little political account. With them there is no fear of a stalwart hereditary peasantry being expropriated, as there is in Marwat.

As to the tenant and labouring classes throughout the district, they are probably as well off as their

fellows in any part of the Punjab. Able-bodied men can always get employment at a fair remuneration, and cultivators are still in demand for the Hár tracts, but the supply is deficient except in drought cycles.

Now to pass on to the landlord class, the savaid poshis who do not cultivate with their own hands. As a rule they are neither so frugal nor prosperous as the peasant proprietary class; good 20 per cent. of them are deeply involved in debt; and a large minority habitually live beyond their income. A few, of course, say 10 per cent., are shrewd careful men, and their holdings and incomes are growing, not diminishing, in amount. Families sink into poverty from two causes, both due to a foolish pride.

The head of the house thinks he must maintain a reputation for hospitality, the highest of virtues amongst Pathans, and to maintain it he mortgages and borrows freely. Then his sons, they are brought up in idleness and married early; and no matter how the *res angusta domi* may press, they disdain to work with their own hands.

CHAP. I. QN.

PUNJAB.

Mr. Thorburn

Bannu.

The following statement has been compiled from particulars furnished by district officers, whose replies to Question 9 are given above, regarding the circumstances of individual agriculturists, whose cases have been selected as types.

The different results arrived at in the several districts may be seen at a glance; and will suggest

the impossibility of forming any accurate conception of the true economic condition of the landed classes by a mere arithmetical process of this kind, as long as agricultural knowledge remains as defective as it now is, among both the district officers and the agriculturists themselves :—

ECONOMIC CONDITION of the AGRICULTURAL POPULATION.

	Delhi District.	Gurgaon District.	Rohtak District.	Hoshiárpur District.	Amritsár District.	Jhelum District.	Muzaffargarh District.	Bannu District.
1. Number of holdings inquired into -	19	24	53	15	6	6	11	3
2. Average number of persons in family -	8.5	6.458	9.415	6.8	10.3	4.16	6.515	7.6
3. " " cultivated acres per holding.	11.5	18.583	29.433	14.974	19	8.182	18	15.75
4. " out-turn of food grain (in maunds) per holding.	85.247	133.673	173.146	96.035	Maunds.	Maunds.	Maunds.	Maunds.
5. " consumption of food-grain and seed per holding.	67.115	51.205	92.483	60.927	100.745	23.77	57.446	60.916
6. " amount of surplus food per holding	18.132	82.468	80.663	35.108	18.017	-4.791	50.501	32.584
7. " value of <i>net</i> value of <i>non</i> -food grains produced per holding.	Rs. 27.3 32.043	Rs. 87.32 18.958	Rs. 75.421 7.654	Rs. 121.027	Rs. 25.743 55.916	Rs. 5.427	Rs. 57.353 102.151	Rs. 34.834 18.3
8. " amount of other miscellaneous sources of income per holding.	54.954	30.385	*52.158	10.608	12.16	44.16	19.614	14
10. " total cash income over and above consumption per holding.	114.297	136.663	*135.233 or, deducting pay&pensions, 118.743	131.635	93.825	38.730	170.113	67.187
OUTGOINGS.								
11. Average revenue, rent, and cesses per holding	33.718	31.492	26.383	37.788	27.513	15	44.511	25.75
12. " payments for hired labour and village menials per holding.	24.105	15.208	9.711	20.813	30.145	—	89.832	9.16
13. " expenditure on <i>non</i> -home grown necessities per holding.	27.221	23.74	22.775	20.8	16.5	7.458	64.416	33.16
14. " total outgoings -	85.044	70.44	58.869	79.401	74.158	21.458	198.759	68.083
15. " surplus or deficit of income over outgoings.	+29.253	+66.223	+76.364	+52.234	+19.667	+16.281	-19.641	-896
16. " number of cattle per holding—			or, deducting pay&pensions, +59.874					
Oxen - - - -	2.263	1.5	2.547	3.93	3.3	2	5.727	3.3
Cows - - - -	2.578	1	1.377	1.06	2.16	16	3.636	3.6
Other animals - - -	3.052	2.25	3	2.8	4.83	1.16	3.818	2.3
Total - - - -	7.893	4.75	6.924	7.79	10.32	3.332	13.181	9.32
17. " possessions, value—								
grain - - - -	Rs. 35.216	Rs. 6.27	Rs. 5.187	Rs. 9	Rs. 13.83	Rs. —	Rs. 8.434	Rs. 1
ornaments and clothes - - -	58.002	27.395	51.669	101.13	23.3	48.3	27.052	30
chattels - - - -	36.213	16.442	36.306	28	30.52	20	23.818	31.16
Total - - - -	129.521	50.107	93.162	131.13	67.086	68.3	60.204	63.16
18. Number of persons indebted -	13	16	27	13	5	6	9	3
19. Average amount of debt - - - Rs.	238.889	203	182.925	247.083	174.4	100.489	632.008	87.6

* Eight persons receive pay or pension, aggregating Rs. 874, deducting which the miscellaneous income of the district averages 35*668.

† Not given separately.

NORTH-WESTERN PROVINCES AND OUDH.

NORTH-
WESTERN
PROVINCES
AND OUDH.Pandit Rad-
hakshen.

Muzaffarnagar.

Example 1.—Dewan Singh, Ját, occupancy tenant of Penna, pargana Baglura, 21st August 1878.

1. Thirty-one bighas pakka is the area of the holding and the whole is cultivated, none left for grazing purposes. Cattle, graze on the shamilat land which amounts to 881 bighas pakka, and is fallow.

2. The family consists of the man's father - 1
Himself and two brothers - 3
Mother - 1
Wife - 1
Sons - 2
Daughters - 2
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3. Food grain produced as follows :—

Designation of Crop.	Area in Pakka Bighas and Biswas.	Yield per Bigha, Pakka.	Total yield.	Rate per Rupee.	Total Value.
<i>Kharif.</i>					
Indian corn -	2	M. s. c. 4 20 0	M. s. 9 0	M. s. c. 0 30 0	Rs. a. p. 12 0 0
Urd -	2	3 0 0	6 0	0 25 0	9 9 9
Juár -	Sown with urd 3	1 20 0	3 0	1 0 0	3 0 0
Juár, urd and til -		Juár. 1 35 0	5 25	1 0 0	5 10 0
		Moth. 1 35 0	5 25	1 0 0	5 10 0
		Til. 1 0 0	3 0	0 13 4	9 0 0
Total -	—	—	—	—	44 13 9
Chari -	3	18 30 0	56 10	3 0 0	18 0 0
Kawar -	1	4 20 0	4 20	0 30 0	6 0 0
Bhusa of kawar -	—	4 20 0	4 20	4 20 0	1 0 0
Do. wheat and barley -	—	—	114 0	5 0 0	27 12 10
Do. gram -	—	—	9 0	3 0 0	3 0 0
Total -	—	—	—	—	55 12 10
<i>Rabi.</i>					
Wheat -	10	4 20 0	45 0	0 25 0	72 0 0
Gram -	2	4 20 0	9 0	0 30 0	12 0 0
Barley -	2	6 0 0	12 0	1 0 0	12 0 0
Masúr -	Sown with barley	6 0 0	12 0	1 0 0	12 0 0
Mustard -		—	1 0	0 13 4	3 0 0
Safflower -		—	0 10	0 20 0	0 8 0
Total -	—	—	—	—	111 8 0

4. Other crops :—

Designation of Crop.	Area in Pakka, Bighas, and Biswas.	Yield per Bigha, Pakka.	Total yield.	Rate per Rupee.	Total Value.
Cotton -	2	M. s. c. 2 10 0	M. s. 4 20	M. s. c. 0 10 0	Rs. a. p. 18 0 0
Sugarcane -	3	0 13 10	39 30	3 8 0	139 6 0
Safflower -	—	—	0 3	0 3 0	1 0 0
Total -	—	—	—	—	158 6 0

5. Rent payable amounts to Rs. 64 per annum, bilmukta or a lump sum.

6. Cost of labour :—

Designation of Workman.	No.	Grain or Saccharine produce allowed.	How cultivated.	Total Grain or Sweetmeat allowed.	Rate.	Value.
Ploughman -	1	1/8th share after deduction of charges of workman.	—	—	—	Rs. a. p. 18 4 6
Carpenter -	—	—	—	1 0 0	1 0	1 0 0
		Sweetmeat 0 1 8	Per rotation for 8 rotations.	0 12 0	3 8	1 0 9
Blacksmith -	—	—	—	1 0 0	1 0	1 0 0
		Sweetmeat 0 0 12	Ditto -	0 6 0	3 8	0 8 4
Potter -	—	—	—	0 20 0	1 0	0 8 0
		Sweetmeat 0 0 12	—	0 3 0	3 8	0 4 0
Peria -	—	—	—	2 0 0	—	7 0 0
Jhoka -	—	—	—	0 12 0	—	1 0 9
Workman -	—	—	—	1 0 0	—	3 8 0
Muthia -	—	—	—	0 8 0	—	0 11 2
Rent of sugar mill -	—	—	—	—	—	8 0 0
Do. of boiling pan -	—	—	—	—	—	2 8 0
Wood -	—	—	—	—	—	3 0 0
Oil -	—	—	—	—	—	2 0 0
Reaping rabi crops -	20	—	0 5 0	2 20 0	0 25	4 0 0
Digging and weeding sugar-cane -	—	—	—	—	—	10 0 0
Total -	—	—	—	—	—	56 13 6

7. Other charges :—

	Rs. a. p.
Iron -	3 0 0
Hackery -	2 0 0
Water bucket -	5 0 0
Bullocks -	15 0 0
Salt and spices -	2 0 0
Cloth -	5 0 0
Utensils -	0 8 0
Shoes -	4 0 0
Khal, &c. -	10 0 0
Total -	46 8 0

8. Dwelling-houses :—

There are three kucha houses; of these one is for cattle and consists of one kotha and one chappar; of two others one occupied by himself has one kotha, one chappar.

Other dwelling-houses occupied by other brothers, one sidari, one kotha.

9. Cattle—

Bullocks -	5
Foal -	1
Buffaloes -	2
Young ones -	2
Cows -	2
Calves -	2
Mare -	1
Total -	15

10. Other property utensils are—

Parat -	1
Tháli -	4
Degchi -	1
Tokni -	2
Lota -	3
Katora -	3
Chamcha -	1
Tawa -	2
Glass -	2
Karhai -	1
Total -	20

One-eighth of a grove is 17 bighas 8 biswas.

11. Sufficient grain retained for one or two months' use, the rest is made over to the village banker.

12. There has been no surplus for the last six or seven years; prior to that, whatever was saved was used in marriage expenses.

13. Has been in debt for last seven or eight years, the total debt now amounting to Rs. 400; of this Rs. 250 were contracted in last and the present year. For Rs. 150 jewels are pledged at Re. 1-8 per cent. per mensem, interest for the remainder two per cent. is charged. Originally the debt amounted to Rs. 45; this sum was borrowed for purchase of a cow, &c. Rs. 35; other petty charges, Rs. 10.

Dealings have continued ever since then, and at the present time the debt amounts to Rs. 400.

In this village there are 164 cultivators; of these only one (Daulat) is not in debt, all the others are involved more or less.

	Rs. a. p.	Rs. a. p.
Total income -	370 8 7	
Deduct value of fodder -	55 12 10	
Expenditure -		314 11 9
Total -		167 5 6
Add sale of ghi -	20	
Mukaddami allowance -	20	40 0 0
		187 6 2

Example 6.—Jawahir Singh, Rawa, of Satheri, occupancy cultivator, 22nd August, 1878.

1. Cultivates 40 bighas pakka. No land set apart for grazing; cattle graze on road and field boundaries or fed on chari and bhusa.

2. The family consists of himself, wife, son and daughter, son's wife; total 5.

3. Food-grain produced as follows :—

Description of Crop.	Area in Pakka Bighas and Biswas.	Field per Bigha, Pakka.	Total Yield.	Rate per Rupee.	Total Value.
<i>Kharif.</i>					
Indian-corn -	1	M. s. 6 0	M. s. 6 0	M. s. 0 30	Rs. a. p. 8 0 0
Rice -	1	3 30	3 30	0 30	5 0 0
Mungi -	1	4 20	4 20	0 25	7 3 0
Urd -	3	3 0	9 0	0 25	14 6 6
Til -	—	—	0 6	0 13	0 7 6
Mung -	1	2 10	2 10	0 20	4 8 0
					39 9 0
Chari -	5	18 30	63 30	5 0	18 12 0
Kawara -	4	3 30	15 0	0 35	17 2 3
Bhusa of urd -	—	4 20	13 20	3 0	4 8 0
					40 6 3
<i>Rabi.</i>					
Wheat -	12	5 10	63 0	0 25	100 13 3
Gram -	4	6 0	24 0	0 30	32 0 0
Barley -	2	7 20	15 0	1 0	15 0 0
Mustard -	Sown with wheat	0 30	0 36	0 13	2 13 9
					150 11 0
Bhusa of wheat -	—	—	156 0	5 0	31 3 0
Do. gram -	—	—	24 0	3 20	6 14 6
					188 12 6
4. Other Produce—					
Sugar cane -	14 10	10 20	47 10	3 p.m.d.	141 0 0
Cotton -	1 0	1 35	1 35	0 10	7 8 0
					149 4 0

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CONDITION OF THE COUNTRY AND PEOPLE OF INDIA.

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5. Rent payable amounts Rs. 106, water-rate Rs. 30=Rs. 136.

6. Charges for labour.

Designation of Workmen.	Number.	Grain or Saccharine Produce Allowed.	How Calculated.	Total Grain or Saccharine produce allowed.	Rate per Rupee.	Value
		M. s.	Rs.	M. s.	M. s.	Rs. a. p.
Ploughmen - - - -	2	—	2-4-0 per mensem	—	—	54 0 0
Cowherd - - - -	1	Grain	—	6 0	0 30	8 0 0
Carpenters and blacksmiths - - - -	2	Grain	1 md. 5 seers, each	2 10	0 30	3 0 0
		Rab	10 rotations at 3 seers each	0 30	0 13	2 4 0
Potter - - - -	—	Grain	—	1 5	0 30	1 8 0
		Rab	For 10 rotations, 8 chtk. each	0 5	0 13	0 6 0
						69 2 0
Peria - - - -	2	—	Per rotation, 8 seers for 10 rotations	2 0	do.	6 0 0
Jhoka - - - -	2	—	Do. at 4 seers per do.	1 0	0 13	3 0 0
Boiler - - - -	1	—	" " 3 1/2 " "	0 35	3 0	2 10 0
Mathia - - - -	1	—	" " 2 " "	0 20	—	1 8 0
Hire of karhai - - - -	—	—	—	—	—	1 4 0
Wood - - - -	—	—	—	—	—	2 8 0
Oil, 7 1/2 seers - - - -	—	—	—	—	—	1 12 0
Weeding cotton, sugar-cane, rice, Indian-corn, &c. - - - -	—	—	—	—	—	10 0 0
Reaping rabi crop - - - -	50	—	5 seers each	6 10	—	8 5 2
						196 1 3

7. Other charges :—

Iron - - - -	Rs. 3
Hackery - - - -	1
Wheels for do. - - - -	2
Bullocks - - - -	5
Salt and spices - - - -	2
Cloth - - - -	5
Utensils - - - -	1
Shoes - - - -	2
	21

8. Dwelling-house :—There are two kucha houses, of these one is occupied as dwelling-house; it has four dukuria; and the other is an inclosure for cattle, containing five chappars, but of this the man only owns 1/4th share. The dwelling-house is entirely his own property.

9. Detail of cattle :—

Bullocks - - - -	4
Cow - - - -	1
Buffalo - - - -	1
Calves - - - -	2
Mare - - - -	1
	9

10. Other property; vessels :—

Thali - - - -	3
Katora - - - -	3
Katori - - - -	1
Tokni - - - -	1
Parat - - - -	1
Lota - - - -	3
Degchi - - - -	1
Chumcha - - - -	1
Glass - - - -	2
Karhai - - - -	1
Tawa - - - -	1
Hukka - - - -	2

Besides half of a grove in 2 bighas 14 biswas. Jewels worth Rs. 150.

11. Grain :—About 25 maunds are retained every year for food. For further requirements the baniya is applied to.

12. Surplus :—There has been no surplus from the last 10 years; when there was any it was spent in marriages or ornaments; never lent out or hoarded at home.

13. The debt is of many years standing, the man's father having commenced it. Some three years ago the debt was paid off by selling surplus produce, jewels, and other goods for Rs. 900; since then it has again risen to Rs. 200; of this Rs. 100 were originally borrowed for purchase of a sugar-mill, interest and further loans have now brought it up to Rs. 200.

In this village there are 110 cultivators; only seven are free from debt.

	Rs. a. p.	Rs. a. p.
Total income - - - -	417 15 9	
Deduct value of fodder - - - -	78 7 9	
		330 8 0
Expenses - - - -	263 1 3	
Profit - - - -	76 6 9	
Add modkuddami allowance - - - -	27 8 0	
		103 14 9

Example 7.—Sriram, Brahman, occupancy tenant of Rampur, pargana Muzaffarnagar, 11th September, 1878.

1. The holding comprises 52 bighas and two biswas pukka; of this 3 bighas are left fallow for grazing purposes, and 49 bighas 2 biswas brought under cultivation.

2. The family consists of himself and his brothers - - - -	2
Brother's wife - - - -	1
Sons - - - -	2
Sons' wives - - - -	3
Son's daughter - - - -	1

Total 9

3. Food grain produced :—

Description of Crops.	Area in Pucka Bighas and Biswas.	Yield per Bigha Pucka.	Total Yield.	Rate per Rupee.	Value.
		M. s.	M. s.	M. s.	Rs. a. p.
<i>Kharif.</i>					
Urd - - - -	5	1 35	9 15	0 30	12 8 0
Shamakh - - - -	Sown with urd	1 20	7 20	1 0	7 8 0
Moth, mung - - - -	7	1 20	10 20	0 30	14 0 0
Bajra - - - -	7	1 20	10 20	0 30	14 0 0
Monji - - - -	5	3 30	18 30	0 25	30 0 0
Total - - - -	—	—	—	—	78 0 0
<i>Rabi.</i>					
Chari - - - -	4	18 30	75 0	5 0	15 0 0
Kawara - - - -	1	3 0	3 0	1 0	3 0 0
Bhusa of urd - - - -	—	—	20 0	4 0	5 0 0
Do. gram - - - -	—	—	18 0	4 0	4 8 0
Do. wheat and barley - - - -	—	—	124 0	5 0	24 12 9
Total - - - -	—	—	—	—	52 4 9
Wheat - - - -	15	4 20	67 20	0 25	108 0 0
Barley - - - -	3	5 0	15 0	1 0	15 0 0
Gram - - - -	4	4 20	18 0	0 30	24 0 0
Masur - - - -	7	1 20	1 20	0 25	2 6 4
Total - - - -	—	—	—	—	149 6 4
4. Other than food grain.					
Cotton - - - -	1	1 35	1 35	0 10	7 8 0
Sugarcane - - - -	3	15 0	45 0	3 per md.	135 0 0
Total - - - -	—	—	—	—	142 8 0

5. Rent payable Rs. 112-14-9; water rate Rs. 60; total Rs. 172-14-9.

6. Charges of labour are :—

Designation of Workman.	Number.	Grain or Saccharine allowed.	How Calculated.	Total Grain or Saccharine allowed.	Rate.	Value.
				M. s.		R. a. p.
Ploughman - - - -	2	Grain	1/4th of 148 mds yield	18 20	1	18 8 0
Cowherd - - - -	—	Do.	For 1 year	12 0	1	12 0 0
Blacksmith - - - -	—	Do.	On 2 ploughs	3 0	1	3 0 0
Carpenter - - - -	—	Rab	On 6 rotations at 1 1/2 seers, @	0 9	3 p.m.	0 10 9
Potter - - - -	—	Grain	On 2 ploughs	3 0	1 m.	3 0 0
Peria - - - -	—	Rab	6 rotations at 1 1/2, @	0 15	3 p.m.	1 2 0
Jhoka - - - -	2	Grain	On 2 ploughs	0 30	1 m.	0 12 0
Workman - - - -	—	Rab	6 rotations at 5 seers, @	0 30	3 p.m.	2 4 0
Muthia - - - -	—	Do.	Do. 3 do., @	0 18	—	1 5 7
Hire of sugar-mill - - - -	—	—	Do. 4 do., @	0 24	—	1 12 10
Ditto karhai - - - -	—	—	Do. 2 do., @	0 12	—	0 14 5
Wood - - - -	—	—	—	—	—	0 12 0
Oil - - - -	—	—	—	—	—	3 0 0
Weeding sugar-cane and cotton - - - -	—	—	—	—	—	2 0 0
Reaping wheat - - - -	10	—	5 seers each	1 10	—	1 0 0
						54 5 7

7. Other charges—

Iron - - - -	3
Hackery and wheels - - - -	3
Bullocks - - - -	10
Salt and spices - - - -	5
Cloth - - - -	5
Shoes - - - -	3
Utensils - - - -	1
Total - - - -	30

8. Dwelling-houses—

For family three kothas.	
Cattle three ditto.	
One dehliz.	

9. Cattle—

Bullocks - - - -	8
Calf - - - -	1

Buffalo - - - -	1
Calf of ditto - - - -	1
Total - - - -	11

10. Other property—

Thalis - - - -	3
Lotas - - - -	4
Katoras - - - -	3
Parat - - - -	2
Tokni - - - -	1
Tawa - - - -	1
Bucket - - - -	1
Karhai - - - -	1
Total - - - -	16

Jewels worth Rs. 200.

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11. The grain produced is used for food, and what remains at the end of the year is sold.

12. Surplus; any savings are spent in marriages.

13. Debt. Nil.

Total income -	-	422	3	1
Deduct value of fodder kept in store	-	52	4	9
Total	-	369	14	4
Charges -	-	257	4	4
Profit -	-	112	10	0

1. The holding comprises 23 bighas 9 biswas pukka. The whole is cultivated; none left for grazing; cattle graze on fields or feed on bhusa kept in store.

2. The family consists of:—

Himself -	-	-	-	1
Nephews -	-	-	-	4
Sons -	-	-	-	2
Wives of brothers and nephews -	-	-	-	5
Nephews' sons -	-	-	-	3
Ditto daughters -	-	-	-	2

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Example XV.—Mula, Banjára, resident of Lachera, pargana Muzaffarnagar, occupancy tenant of Semli, 10th September 1878.

3. Food grain:—

Description of crop.	Area in pukka bighas and biswas.	Yield per bigha pukka.	Total Yield.	Rate per acre.	Value.
<i>Kharif.</i>					
Urd	2	M. s. c. 2 10 0	M. s. c. 4 20 0	M. s. 0 25	Rs. a. p. 7 3 3
Moth	1	2 10 0	2 0 0	0 30	3 0 0
Maki	1	5 10 0	5 10 0	0 30	7 0 0
Rice	2	3 0 0	6 0 0	0 30	8 0 0
					25 3 3
Fodder, chari	4	18 0 0	72 0 0	5 0	14 6 3
Bhusa of urd	—	—	4 20 0	4 0	1 2 0
Ditto wheat and barley	—	—	75 0 0	5 0	15 0 0
Ditto gram and moth	—	—	11 10 0	4 0	2 13 0
					33 5 3
<i>Rabi.</i>					
Wheat	7	4 20 0	31 20 0	0 25	50 6 4
Gram	2	4 20 0	9 0 0	0 30	12 0 0
Barley	1	6 0 0	6 0 0	1 0	6 0 0
Mustard	With wheat.	0 7 8	1 12 8	0 15	3 8 0
					71 14 4
4. Other than food grain.					
Cotton	1	2 25 0	2 25 0	0 10	10 8 0
Safflower seed	With gram.	1 5 0	2 10 0	0 25	3 9 7
Ditto flower	Ditto.	0 7 8	0 15 0	0 3	5 0 0
					13 1 7

5. Rent payable Rs. 39-7 per annum.

6. Cost of labour.

Designation of Workmen.	Number.	Grain or saccharine allowed.	How calculated.	Total grain or saccharine allowed.	Rate.	Value.
Carpenter -	1	Grain	Allowed, per annum.	1 10	0 30	1 10 8
Blacksmith -	1	—	—	1 10	0 30	1 10 3
Potter -	1	—	—	0 25	0 30	0 13 4
						4 2 8
Reaping rabi and weeding kharif crops -	15	—	—	1 5	0 30	1 8 0
						5 10 8

7. Other charges—

Iron -	-	2
Hide -	-	2
Salt and spices -	-	2
Cloth -	-	2
Shoes -	-	1

9

8. Dwelling-houses—

For family 1 house containing—

Dalan -	3	Kothris -	2
Kothas -	3	Dehliz -	1
For cattle, 1 kotha.			
For fodder, 1 ditto.			

9. Cattle—

Bullocks -	-	4
Buffalo -	-	1
Cow -	-	1
Calf -	-	1

7

10. Other property, utensils—

Tokni -	5	Chamca -	4
Lota -	6	Tawa -	3
Thali -	7	Parat -	4
Katora -	5		
Karhai -	3	Jewels nil.	
Glasses -	3		

11. Grain kept in store for food, 25 maunds.

12. Surplus. Has never been able to save; the whole income is spent. A small sum is realised by letting out the bullock-cart.

13. Debt.—Six years ago Rs. 100 were borrowed for purchase of bullocks. Dealings have continued ever since, and the debt now amounts to Rs. 300; interest is charged at 24 per cent. per annum.

Total income -	-	209	8	4
Deduct value of fodder kept in store	-	33	5	3
Other charges	-	176	3	1
Profit -	-	122	1	5

CHAP. I. QN. 9.

NORTH-
WESTERN
PROVINCES
AND OUDH.Pandit Rad-
hakishen.

Muzaffarnagar

M. J. Smith, collector of the district, personally inquired into the circumstances of 10 cultivators in 10 villages, selected from all parts of the district. The instances chosen appear to be tenants holding more land than is usual, the smallest area being about 6 acres. The information he collected is given in too ample a form for reproduction, and it will be sufficient to show the average results for the 10 tenants. They held on an average 30 acres apiece, of which 25 acres were under good crops, and the outturn was 244 maunds of food, and 260 Rs. worth of other crops, chiefly cotton, indigo, and sugar. The average number in each family was 15, and their yearly consumption of food was 111 maunds, or a little over 7 maunds or $\frac{1}{4}$ of a ton per head. The value of their surplus crop was Rs. 174, which, added to the non-food crops gave a disposable capital of Rs. 434 to each tenant. Against this have to be set the following items:—

Wages of hired labourers	-	64	4	6
Other expenses (viz., seed grain, water rent, cost of expressing sugar, fees to village menials, &c. -	-	116	12	0
Rent -	-	115	1	0
Average yearly cost of bullocks -	-	27	0	0
Average yearly cost of agricultural implements -	-	8	1	6

Purchase of necessaries of life not produced on the land	-	67	6	0
Total -	-	398	9	0

Mr. J. Smith

Meerut.

Average surplus to each tenant Rs. 35 7 0

These 10 cultivators owned between them the following stock:—

Ploughs -	-	27
Bullocks -	-	68
Cows -	-	46
Buffaloes -	-	48
Bullock carts -	-	11
Sugar mills -	-	3
Horses -	-	6
Bullock carriages (for riding in) -	-	2

Out of 148 persons composing the 10 families, 37 wore cloth of English and 111 cloth of native make. Five were in debt, and owed Rs. 1,550 between them. This is rather less than the value of the annual income from their land, after deducting the food required for consumption.

Mr. Smith further took a census of the 10 villages, and found that they contained 3,916 cultivating proprietors and 2,607 tenants. Of the former class 48 per cent. were indebted, owing on an average Rs. 35 each, of the latter 67 per cent. owing on an average Rs. 17 each.

The degree of success in agricultural matters depends not only on the description of soil and amount of rent-rates, but also a great deal on the nature of the occupancy tenure and the caste of the cultivator. A Jat and a Gujar holding the same kind of land and paying the same rent-rate are found to differ from each other very much in their prosperity, simply because the former is much more enterprising and frugal than the latter, and the women of his house assist him in field work, while those of the other merely do house work. Again a khudkasht proprietor or an occupancy tenant generally improves his holding by money and labour, whereas the tenant-at-will does no such thing. In calculating the produce as well as the food consumption in the annexed statements it has been taken into consideration that during the harvest seasons, or four months in the year, no tenant buys food grain, but uses the new produce of his own field, and counts the remainder as the outturn from which to pay his landlord and the banker. When grain becomes dear, the poorer tenants use carrots, methi, and cucumbers, as a part of the daily food, while butter-milk, boiled with ground makka, or juar, is largely consumed even in favourable times; cloth expense is generally very little amongst the cultivating classes. The women spin thread from their own cotton and get coarse cloth woven by the village weaver. For defraying wedding or funeral expenses, there is a very useful custom, generally among the villagers and chiefly among the lower classes, which is called nota, or payment of invitation presents. Each neighbour or friend pays at such ceremonies a rupee or eight annas to the head of the family, and the sum so collected is usually sufficient for meeting all the charges of the ceremony including the feast. Thus

every householder expends annually a small sum in these presents and gets the whole back on the occasion of a marriage or death in his own family.

It will be observed from statement A. that very few tenants keep grain in their house for the daily expenditure. This is owing to the fact that the baniya supplies them with grain and other necessary articles for four months before each harvest, and also pays the rent for them, and when the produce of the field is ready, he takes nearly the whole away in satisfaction of these advances and interest. For the grain supplied he charges half anna per rupee above the market price, and when he takes the produce home, he credits its value to the owner's account at the rate of half anna per rupee less than the market value. Besides these discounts and premiums he takes interest at 25 per cent. per annum. Notwithstanding these heavy charges the banker's failure is calamitous to the village. In fact the baniya is as it were the common stock-keeper of the village community, and if he fail the whole community suffers. He is very seldom able to recover his debts in full. When the debt becomes old and large the debtor generally convenes a panchait, and offers the lagana, which means that he is willing to let the creditor take all the moveable property he possesses. The panchait acting as a court of insolvent debtors fixes the prices of each article rendered (generally cattle), and this price is almost invariably much higher than the market price. When the old account has thus been cleared off the new account begins, and the balance, if any, struck by the appraisers is put down as the opening balance on the debit side in the baniya's bahi. It often happens that when a man is too much involved in debt he secretly deserts the village, carrying away what cattle or other things he pos-

Raja Lachma
Singh.

Bulandshahr.

sesses. Under these circumstances the village baniya is seldom a lakhpati (or owner of a lakh of rupees). Cost of house repairs in villages is very little or nothing. The men make their own walls and chhappers and the women plaster the walls with clay and cowdung. Houses are generally made with mud and a few with sunburnt bricks. Those with flat roofs are called kothas, and the thatched ones chhaniha. Among the higher castes a house is separately enclosed with walls and has a dubari (portico) for the entrance, but among the poorer classes several families have their houses in the same enclosure with a common doorway. Cattle are kept in one of the rooms in the house if there is no separate enclosure (gohra) for them. Among the items of income (of the cultivators) other than the produce of land, the principal one is the yield by cattle, and it consists of the sale proceeds of ghi and homebred cattle.

Generally speaking, cultivators invest their savings in jewels which they sell or mortgage again in time of need, but I believe there are not more than 10 or 12 in a 100 who are in a position to do so, the remainder being more or less in debt. The debts seem chiefly to be due to the exorbitant charges of the money lenders and in some cases to litigation and

marriage expenses. The average amount of debt per tenant comes to Rs. 108 for ghair maurusi, Rs. 176 for maurusi, and Rs. 63 for khudkasht holders, or Rs. 40, 60, and 13 per cent. respectively on their annual incomes. The reasons why the debt of a maurusi tenant is more than that of a ghair maurusi one seem to be these that (1), knowing that the maurusi is not likely to abandon his home or holding the baniya is more willing to lend money to him than to a tenant-at-will, and (2), having no permanent right in his holding, the tenant-at-will often abandons the village, and when he takes his abode in a distant village, all the old debts are supposed to be washed off. The baniya takes no bonds and his ledger is not as accurate as it ought to be. Hence he does not follow the runaway tenant to realise his debts by suit. It is on account of these risks that the village banker charges high interest and is still in the long run not a very wealthy person.

(The following figures are supplied by Raja Lachman Singh, as the results of his personal inquiries into the condition of 46 cultivators in 12 selected villages.)

BULANDSHAHR.

Averages per Holding per Annum.		Proprietary Cultivators.	Occupancy Tenants.	Tenants-at-Will.
No. of Cases inquired into	-	11.	16.	19.
Average area per holding	-	Bighas. 34 7 0	Bighas. 22 0 0	Bighas. 25 7 0
" quantity of food-grain produced per holding	-	Mds. s. c. 152 18 0	Mds. s. c. 114 30 0	Mds. s. c. 126 10 0
" value of "	-	Rs. a. p. 176 11 0	Rs. a. p. 133 7 0	Rs. a. p. 141 5 0
" of other produce	-	216 4 0	81 3 0	99 8 0
" of total produce	-	393 0 0	214 0 0	240 13 0
" other income	-	87 6 0	57 12 0	25 1 0
" of total income	-	480 6 0	272 6 0	265 14 0
" rent or revenue	-	75 0 0	78 8 0	90 6 0
" cost of hired labour	-	60 4 0	12 2 0	12 10 0
" interest paid	-	32 7 0	36 11 0	25 11 0
" of other charges	-	83 3 0	47 12 0	48 9 0
" of domestic charges	-	180 13 0	110 6 0	83 4 0
" of total charges	-	431 11 0	285 7 0	260 8 0
" profit	-	48 10 0	-	5 5 0
" loss	-	-	13 1 0	-
" number of dependants	-	12.7	11.7	9.7
" debt	-	63 10 0	172 4 0	108 7 0
" number of bullocks	-	5.3	3.7	2.8
" of other cattle	-	8.0	3.7	2.8
" quantity of grain in store	-	Mds. s. c. 59 20 0	Mds. s. c. 3 30 0	Mds. s. c. 1 2 0
" value of "	-	Rs. a. p. 119 0 0	Rs. a. p. 7 8 0	Rs. a. p. 2 2 0
" of cattle	-	321 0 0	159 14 0	126 9 0
" of other moveable property	-	209 1 0	15 5 0	3 11 0
" of total property	-	649 0 0	182 11 0	132 6 0
" of produce per bigha	-	11 7 0	9 12 0	9 8 0
" rent or revenue per "	-	2 2 11	3 9 1	3 9 1

It is impossible to reprint the accounts given (interesting though they are) of all the 46 holdings, but a few are excerpted to show the details on which the above figures are based.

Mauza Semli, pargana Baran.—This village has no canal irrigation, but the proprietor has constructed five large masonry wells, and thereby made nearly the whole of the cultivated area irrigable. Rent-rates are so high that, with one or two exceptions, all the tenants are largely in debt. Except one Gujar and one Chamár, all the tenants are Lodhas, a very industrious class whose women assist the men in field work. A majority of the cultivators are maurusi, but there is no difference in the rates paid by maurusi and ghair-maurusi tenants.

The following are the statistics regarding three tenants of this village taken at random.

(1.) Kalwa Lodha, occupancy tenant of bighas 13-13, viz., 2 dry and 11-13 wet. He is one of the poor tenants.

Family, 8.		Cattle, 4.	Property.
Adults.	Children.		
1 self. 1 brother. 1 son. 1 nephew. 1 wife. 1 daughter-in-law. 1 niece-in-law.	1 grand nephew.	2 bullocks. 1 cow. 1 buffalo. Worth Rs. 70	Rs. 200 in debt. No grain or property.

Income.		Charges.	
	Mds. Rs.		Rs.
oighas makka	15 15	Rent - - -	65
1/4 bigha cotton	4 7	Seed - - -	8
3 1/4 bighas juár	14 14	Instruments - -	8
4 1/4 " wheat	23 34	Interest - - -	48
1 1/4 bigha kasúm	16	2 bullocks of Rs. 30	4
3-13 " carrots for use	-	Total - - -	133
1/2 " barley	28 28	Domestic expenses as detailed below.	-
tará and sarson	5 12	Grand total -	213
15-13 Total (2 bighas 2nd crop)	126	Deficiency of Rs. 15, hence debt.	-
Earnings of two men of the family who work as labourers for others	72	This tenant is usually about Rs. 150 in debt.	-
Total -	198		-

Detail of Domestic Expenses.

	Rs.
Food, 7 sers a day, or 43 mds. for 8 months	43
Clothing - - -	20
Spices, &c. - - -	12
Notás (invitation presents) - - -	5
Total - - -	80

(2.) Silú Lodha, occupancy tenant of bighas 24-11, of which four are dry and the remainder irrigated. He is one of the poor class tenants, usually Rs. 200 in debt.

Family, 8.		Cattle 4.	Property.
Adults.	Children.		
1 self. 1 father. 1 brother. 1 mother. 1 wife. 1 sister-in-law.	1 son. 1 daughter.	4 bullocks, worth Rs. 90.	No grain or property. Rs. 200 in debt.

Average income.		Charges.	
	Mds. Rs.		Rs.
1 bigha makka	- 7 7	Rent - - -	108
2 1/4 bighas cotton	- 3 39	Seed - - -	12
4 " chari and juár	- 12 12	Instruments - -	8
1/4 bigha carrots for use	-	Interest - - -	48
3 bighas wheat	- 56 84	4 bullocks of Rs. 90 to work 8 years	11
1 " kasúm	- 16	Total - - -	187
8-6 " barley and peas - - -	- 65 65	Domestic expenses as detailed below -	69
tará and sarson 5 1/2 14	-	Grand total -	256
25-11 Total (1 bigha 2nd crop) -	237	Deficiency of Rs. 19, hence debt.	-

Detail of Domestic Expenses.

	Rs.
Food, 6 sers a day, or 36 mds. for 8 months	36
Cloth - - -	16
Spices, oil, tobacco, &c. - - -	12
Notá - - -	5
Total - - -	69

(3.) Dabi Lodha, occupancy tenant of 43 bighas—4 dry, 39 irrigated. One of the well-to-do (comparatively) tenants usually Rs. 200 in debt.

Family, 9.		Cattle, 13.	Property.
Adults.	Children.		
1 self. 1 wife. 1 son. 1 daughter-in-law. 2 brothers. 2 sisters-in-law.	1 son. 2 daughters. 5 nephews. 3 nieces.	6 bullocks. 2 buffaloes. 4 calves. 1 horse. Worth Rs. 260	Rs. 150 in debt. No property but 10 maunds of grain at present.

Average income.		Charges.	
	Mds. Rs.		Rs.
4 bighas makka	- 30 30	Rent - - -	186
8 " juár	- 32 32	Seed - - -	25
2 " cotton	- 2 26	Hired labour -	36
3 " chari for use	-	Instruments -	10
13 " wheat	- 91 136	Interest - - -	36
6 " barley	- 48 48	4 bullocks Rs. 120	15
7 " gojai	- 52 65	Total - - -	308
2 " peas	- 14 14	Domestic expenses as detailed below -	141
2 " kasúm	- 30	Grand total -	449
Tara and sarson 14 35	-	Deficiency of Rs. 33, hence debt.	-
47 Total (4 bighas 2nd crop) -	416		-

Detail of Domestic Expenses.

	Rs.
Food, 12 sers a day, or 73 mds. for 8 months	73
Clothing - - -	38
Spices, &c. - - -	20
Notás - - -	10
Total - - -	141

(1.) Naná Ját, cultivating proprietor of 20 bighas and occupancy tenant of 19 bighas; total, 39 bighas, all irrigated from the canal. A well-to-do tenant; lives in a better style than the average. Women assist in field work.

Family, 7.		Cattle.	House of Mud.	Property.
Adults.	Children.			
1 self. 1 wife. 3 sons. 1 daughter-in-law.	1 son.	4 bullocks. 4 buffaloes. 2 cows. 1 pony. 2 thatched houses for cattle. Rs. 400.	2 large kothas. 1 " dalán. 1 " dubari. 1 " thatched house for cattle. 1 flat-roofed do.	Rs. 500 worth of jewels; 80 mds. of grain in store.

Average Income.		Charges.	
	Mds. Rs.		Rs.
6 bighas sugarcane	- 300	Revenue of 20 bighas	45
1 bigha indigo	- 10	Rent of 19 "	38
6 bighas cotton	- 7 91	Wages of labourers	36
6 " maize	- 40 40	Wages of coolies for weeding crops	6
13 " wheat	- 80 120	Implements - - -	10
3 " barley	- 21 21	Seed - - -	25
5 " peas	- 30 30	Water rent - - -	69
6 " chari and hemp for use.	-	4 bullocks, worth Rs. 300	38
46 total (7 bighas 2nd crop).	612	Domestic expenses (detailed below) -	186
From buffaloes and cows	50	Grand total -	453
Grand total -	662	Profit Rs. 209, partly invested in jewels or landed property or grain, and partly expended in ceremonies.	-

I. QN. 9.

Detail of Domestic Charges.

	Rs.
Clothing for eight persons -	40
Spices, sugar, oil, tobacco, &c. -	30
Food, 8 sers a day, or 49 maunds for eight months (half wheat and half coarse grain) -	61
Chaupal expenses -	30
House repairs -	15
Notás -	10
Total -	186

(2.) Bhao, Ját, proprietary, cultivator of bighas -	20.11
Maurusi, cultivator of -	5.0
Ghair-maurusi, cultivator of -	17.0
Total -	42.11

14 dry.
28 wet.

Is a well-to-do tenant. Has recently bought land in a village for Rs. 850.

Family, 27.		Cattle, 21.	House, mud made, two enclosures.	Property.
Adults.	Children.			
1 self. 1 father. 4 brothers. 2 sons. 2 nephews. 1 wife. 4 sisters-in-law. 1 mother. 1 daughter-in-law. 1 nephew's wife.	3 sons. 5 nephews. 1 niece.	6 bullocks. 1 buffalo. 6 cows. 7 calves. 1 horse. Worth—Rs. 486.	4 kothás. 1 atari. 1 atto. 1 Kothri.	60 mds. of grain. Rs. 100 worth of jewels; Rs. 500 in debt on account of purchasing land.

Average Income.		Charges.	
Mds.	Rs.		
3 bighas makka	21 21	Revenue of bighas 20-11	28
8 " sugarcane	— 400	Rent of 22 bighas	57
2 " cotton	2.14 30	Water rent	54
5 " chari for use.	—	Hired labour	36
17 " wheat	102 153	Implements	10
2 " oats for use	—	Weeding	3
8½ " of cattle	—	Digging cane	24
8½ " barley	68 68	Six bullocks, worth Rs. 300	38
45½ total (3 bighas double crop)	— 672	Seed	23
From cows and buffalo and horse	— 100	Total	273
From cart	— 50	Domestic charges (detailed below)	402
Grand total	822	Grand total	675
		Profits, Rs. 147.	

Mr. E. Alexander.
oradabad.

Example 1. Village Khanpur, Pargana, Sambhal.—A purely agricultural village, but close to the large town of Sambhal and similar to the sarais of Sambhal in its constitution, a very large portion of the area being comprised in small properties (called milks), belonging for the most part to other persons than the owners of the village in which they are included geographically.

The following statement in detail explains the constitution of the village clearly. I have not given the names of the owners of each property, as there are so many; they would occupy a great deal of space with no advantage; nor have I considered it necessary to

Detail of Domestic Charges.

	Rs.
Food of 27 persons, 20 sers a day, or 122 maunds for eight months (half wheat and half coarse grain) -	153
Clothing, Rs. 5 each adult, and Re. 1 each child -	99
Spices, sugars, oil, &c. -	40
Chaupal expenses -	30
House repairs -	15
Food for horse and bullocks (6 sers a day) -	55
Notás -	10
Total -	402

(3.) Zulfi, Ját, cultivating owner of 10 bighas and ghair-maurusi of bighas 5.6, all irrigated from canal. Is one of the middle-class tenants, never in debt.

Family, 4.		Cattle, 5.	House of Mud.	Property.
Adults.	Children.			
1 self. 1 brother. 1 nephew. 1 wife.	Nil.	2 bullocks. 1 heifer. 1 cow. 1 calf. Worth—Rs. 108.	1 kothá. 1 dubari. 2 thatched rooms.	7 mds. grain. No other property. No debt.

Average Income.		Charges.	
Mds.	Rs.		Rs.
1-6 bighas cotton	1 13	Revenue of 10 bighas	25
1-15 " sugarcane	70	Rent of bighas 5-6	40
3-7 " chari for —	—	Seed	10
5-6 " cattle.	— 50	Water rent	31
2-4 " indigo	13 13	Instruments	5
6-14 " barley	44 66	Two bullocks, Rs. 80	10
20-12 total (5-6 bighas, second crop)	212	Total	121
		Domestic charges (detailed below)	83
		Grand total	204
		Profit, Rs. 8.	

Details of Domestic Charges.

	Rs.
Food, 4 sers a day, or 24 maunds for eight months (half wheat and half barley) -	30
Cloth -	20
Spices, &c. -	18
Notás -	5
House repairs -	10
Total	83

show the area and revenue of each milk separately where it is below 50 bighas, i.e., about 7½ acres:—

	Whole Area.	Cultivated.	Revenue Assessed.
I.—Khalsa land.			
Patti No. 1 -	58	42	75
" 2 -	56	38	63
" 3 -	55	45	75
" 4 -	55	42	70
Land common to all 4 pattis -	1½	—	—
Total -	225½	167	283

DAILY LIFE AND CIRCUMSTANCES OF CULTIVATORS.

257

[N.B.—Each patti is separately managed, and virtually quite independent of the other. The land in common is only a pond and the village site. Only tenants live on the latter, the proprietors all live in Sambhal.]

	Acres.	Acres.	Rs.
II.—Milk No. 1 -	8	7	14
" 2 -	51	46	70
" 3 -	15	13	15
" 4 -	32	28	44
" 5 -	15	14	26
" 6 -	9	9	14
" 7 -	14	11	24
" 8 -	27	21	37
" 9 -	97	88	130
" 10 -	15	13	22
" 11 -	10	10	17
Milks Nos. 12 to 22 -	42	about 21	about 54
Total	335	281	467

N.B.—It will be seen that the area of the milks exceeds that of the khalsa, a very common feature in the constitution of these villages near Sambhal; also that with the exception of the smaller plots, several of which are groves, the land of the milks is as a whole highly cultivated; the per-centage of land uncultivated being extremely small.

Except the owners of three or four of the smaller plots, all the proprietors of the milks are non-resident, most of them being inhabitants of Sambhal, but some living at a considerable distance.

The revenue of these plots which pay over Rs. 50 is paid by the proprietors direct; that of those paying less through the two lambardárs, on whom a rather burdensome task is thus thrown.

Some of the milks are leased, in the others collections are made by the owners themselves or by their agents. In any one of the three cases, the landlord or his representative only pays a flying visit to the village two or three times in the year. Under this state of things there is very little "management;" the tenants look after themselves and their land, and it speaks well for them that matters work as smoothly as they do.

Only about 21 acres are cultivated by the proprietors of the land, and part of this, though classed as their sîr, is actually cultivated by tenants entered as their shikmis. About three acres more are held by non-resident tenants; all the rest is held by resident tenants.

Their exact number I have not been able to ascertain; but, including women and children, it is about 350. From the constant repetition of holdings, owing to the number of different properties in which one man sometimes cultivates, the record of the number of holdings gives no sufficient clue to the number of individuals.

There are, however, about 80 inhabited houses in the village, and of these only seven are occupied by non-agriculturists. Taking 70 houses as occupied by agriculturists, the average number of inhabitants for each may be taken as between four or five, probably nearer five. So there are between 300 and 350 cultivators; of these 95 are men in whose name land is recorded, and the rest are their families.

The average rent paid on the better class land is Rs. 4 Ga. an acre, that on the inferior land Rs. 3 4a., and on some fields Rs. 2 7a.

The soil is all naturally light and sandy; near the village it has, however, been worked up, and fetches the higher rent above mentioned.

On the whole the tenants as a body are well off. The following examples are taken of a tenant's and a labourer's condition at this particular time (January):—

Tenant.

Chajju, son of Dilla Bhagwan—	Acres.	Rs.	a.	p.
Holds in patti No. 3 -	3	at rent of	11	0 0
Q 3387.				

Acres. Rs. a. p. CHAI

In a milk belonging to the same proprietors - 1½ at rent of 5 12 0
Also with his cousin, Bidha Bhagwan, in another milk - ½ " 2 2 0
Has planted this year 1 acre canç;
" " ½ acre cotton;
" " 2 acres bajra, mung, urd;
" " ¾ of an acre wheat, including the field held with Bidha.

He has a wife and two children, was free from debt till last year (he says), when the harvest being very bad, he borrowed Rs. 36 from the sugar manufacturers with whom he has dealings for the juice of his cane. The cane this year being very poor, he has only paid back Rs. 30.

He has lived this year on the money borrowed, and on the produce of the two acres kharif. Intends to sell some cotton he has left to pay his rent, but will probably have to borrow again to pay part of it, and to get on till the rabi is ready for cutting.

His wife prepares the cotton for sale, and helps in the fields at different times; one of his sons is old enough to do some work too.

Yesterday (January 13th) he got up about 5.30, having slept in a shed by the kolhu where his cane was being crushed, and assisted by a hired labourer and his own son worked at crushing cane all day, though from about 6.30 with occasional rests, when the vessel used for holding the juice was filled and required emptying; he also changed occupations every two hours when his pair of bullocks was taken out and another pair changed.

Three pairs of bullocks were worked, one of his own and two others of other tenants, with whom he had arranged to co-operate.

Whilst his own pair was working he drove them. When they were taken out he looked to their food, and then busied himself cutting the cane into pieces for crushing, collecting the crushed pieces, and other miscellaneous work.

After each vessel was filled (in about four hours) they all rested and smoked, and after the third had been filled they eat their food; this consisted of jowar and urd, ready made up into cakes. Work stopped about seven in the evening, after which they had another meal of the same food, and went to sleep about eight.

The allowance of food to the labourers was half a seer at each time, and he himself took about the same.

The labourer, Kallu, Chamar, lives in the village. He has a house with two rooms; no cattle, and no land. He lives by day-labour, and supports a wife and a daughter aged about five. His wife occasionally does some work in the fields, but usually stops at home to look after the house and child.

At present Kallu gets his daily food, one seer of either jowar or bajra, made up ready into cakes, with ghi, and a few pieces of sugar-cane to flavour it. He lives at the shed where the kolhu stands day and night, and works throughout the day, beginning at about 6, by cleaning out the kolhu and feeding the cattle and getting things ready. At about 6.30 or 7 regular work begins, and his share is to keep the mill supplied with pieces of cane, and to keep the pieces even under the crusher.

Like the others he gets a rest whenever a vesselfull has been crushed, i.e. once every three or four hours. He eats his food at about noon, and at evening about 7, after all the work is over. He sleeps in the shed, receiving a blanket from his employer, which he only retains as long as he is employed in his service, and has to give up afterwards. He also, however, gets one rupee eight annas for every "harda" (100 maunds) of cane juice (really about 60 maunds weight in ordinary measure) which is pressed out.

It takes about a week to press one harda, so that just at present he is in receipt of about eight rupees a month, besides his own food; but of course this is an exceptional state of things. He is working hard, and

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there is some risk of injury, as if his hand got caught under the crusher he would probably lose the use of it.

His wife and child live (he says) on about two rupees a month. What he makes now will pay his debts (three rupees some annas), and keep him in the hot weather when he finds little to do. From now till after the rabi has been cut and threshed he expects to have sufficient work to do to support himself and his family without touching what he can lay by now.

He spends about two rupees a year on clothes. He has a "kamal" (blanket) of his own which he bought ten months ago. He expects this to last him for another year or more. Neither he nor his wife wear shoes; the two rupees is spent on body clothes, and when he buys a new kamal this is an extra expense costing about one and a quarter more. He only gets a new kamal when he is in funds after work on the cane mills.

Example 2. Mauza Rehri, Pargana Hassanpur.—This is only partly an agricultural village. It is divided into two pattis or shares, one of 12 biswas and the other of 8 biswas, taking the whole village at 20 biswas, as is the custom in this pargana.

The areas of the two pattis are :—

Cultivated.		Culturable.	Barren.	Total.
Biswas.	Acres.	Acres.	Acres.	Acres.
12	209	352	23	584
8	121	186	12	419

Only 26½ acres are held in sir or as home farm, all the rest is held by tenants.

291½ acres with right of occupancy, and 4½ without; the remaining 7½ acres being held rent-free for service. There are no milks.

Each patti has a separate lambardár, and rents are collected separately. There are altogether 1,334 persons residents in the village; of these 820 are agriculturists and 514 non-agriculturists.

The zamindars live in the neighbouring village of Rehra. The tenants of Rehri hold a few fields in Rehra; but generally speaking, the cultivation of both villages is carried on by resident tenants.

There are 184 men who live by other means than agriculture. Of these 37 are banias, traders, and money-lenders, who keep shops; 56 are manihars (makers of the rough glass called kach); six others, who are also manihars, but do not make the glass, earning their money by working it up into small articles such as buttons; 32 dhunias, who weave and clean cotton; five dhobis, who live by washing clothes; two garariás, who keep sheep and earn a living from the sale of kamals made from the wool; five beggars, who do no work of any kind; five blangis, who act as scavengers; one nadaf, or weaver by profession, four rangrezes, who dye cloth; two telis, to extract and sell oil; seven chipis or printers, who stamp patterns on cloth; one carpenter, two carriers, who keep bullocks and ponies for carrying grain; and 17 others who live by day-labour of various kinds—digging, reaping, making walls, &c., whatever they can find to do.

The number of persons supported by these 184 men may be estimated at about 330, rather less than two to each man. The cultivators, including women and children, number 820. They are, as a rule, well to do. The following examples show the condition and an ordinary day's work of a cultivator and of a labourer who owns no land :—

Nathu, son of Ganga Ram, Murao, cultivator.—Holds 20 bighas 4 biswas,* with right of occupancy, at a rent of Rs. 14 4 0 cash in patti 12 biswas. He has a family of a son about 14 years old, who helps in cultivation, a wife, a sister-in-law (a widow), and a child about three years old. The family expenses are all in one, and amount to about 5 annas a day, the total coming to about Rs. 115 a year, besides what they spend on clothes, estimated as Rs. 22 a year more.

* A little over three acres.

The following is an account of a day's work done about a week ago (January 16th) :—

He rose about 6.30 and let out his bullocks, taking them to his field in which wheat is sown. There tying them up, he and his son gave them their fodder, and then set to work to irrigate a field from a kacha well, using the lever (dhenkal) to bring up the water in a small earthen vessel. They worked at this from about 7.30 till noon, taking turns at the lever and at spreading the water over the field. About noon they took their meal of dāl, made from moth and cakes of joār. They eat this on the spot, resting for about half-an-hour. The food was brought them by their wives ready for use, with water and salt; whilst working they eat one or two carrots (raw). Both afterwards worked at the well till about 3 p.m., first as a relief digging up carrots in another field for about half-an-hour; these were carried home by the son as Nathu dug them up, the field being close to their house. After 3 p.m. they separated, Nathu going off to look after a field sown with tara, in which he set up some scarecrows, and his son taking off the cattle to let them graze for a short time before shutting them up. Nathu, on his way home, about 5 p.m., plucked some methi (a plant with small leaves, used to flavour the "roti," or gram cakes, eaten by the poorer classes); depositing this, he went off to scare away the birds from their evening meal in the fields and also to watch his carrot crop against trespasses of cattle returning to the village about this time. His son tied up the cattle in their shed about 5 p.m., and gave them water and bhusa. Nathu returned home about 7.30 p.m., and the family then took their evening meal; this was a little less than half a seer of joār cake with methi (instead of salt) per head for the adults and the elder son.

After this was over Nathu went out and passed the night under a small shelter set up at the corner of his field of carrots, in order to guard it against thieves or loose cattle. When he first went out in the morning he had on a dhoti (waist-band), a mirzai or short coat of rough cloth (garhá), and a thick razai, padded with cotton wool. He laid aside the razai when he began irrigation, and put on a pagri of cloth. After about 10 a.m. he took off the mirzai, putting it on again after his midday meal. After he stopped irrigating he put on a chadar (a coarse kind of sheet), worn like a shawl. He took his razai again when he went out to sleep at his field.

Mehtab, son of Ilahi Bakhsh, Hajjam, labourer, lives with his mother, an old woman of about 50; has no wife nor family. On the same day as above described rose about 7 a.m., went to the house of a bania and began work cleaning cotton, about 7.30. This work is done on contract, two seers of cleaned cotton being paid for at the rate of one anna (the cotton of course belonging to the bania). His mother went with him and worked too. At noon they got one roti of moth and some curds between them, about one quarter of a seer each; set to work again as soon as they had disposed of this, i.e., after about a quarter of an hour, and worked till sunset (about 5.20). Between them they cleaned two and a half seers of cotton, i.e., they extracted two and a half seers of wool separate from the seed, which weighs about three times as much as the wool; so perhaps it is more correct to say they cleaned 10 seers.

For this they were entitled to one anna and three pie; out of this they were cut six pie advanced a few days before, and carried off only nine pies. They went off with this and gathered some "bathua" (a wild plant which is edible); they had some makka (sufficient for about two days) laid up at home; the mother made some cakes of this, grinding it on a stone, and they both eat it with the bathua. Each got about three-quarters of a seer of the makka cake and one quarter seer bathua by about 8 p.m. After this they went to sleep.

During the day Mehtab wore a small pagri of dirty white cloth, a dhoti of garha, and a very old padded

mirzai. At night he had an old kamal, which he bought more than a year ago partly on credit, but has since paid for.

His yearly expenditure is about Rs. 32 for food, including that of his mother, and about Rs. 3 8 0 for clothes of all kinds. The food they get from their employes is included in this estimate. Of course on the day described it was paid extra, besides the cash payment on the cotton cleaned.

Example 3.—Dhabharsi, Pargana Hassanpur.—An agricultural village situated on the high sandy land, about seven miles from Rehri, which is on the low-lying "khadar" land.

The village is primarily divided between two sets of sharers, one Muhammadans, the other Hindus; both were originally Hindus (Tagas), but the ancestors of the first set turned Muhammadans about 300 years ago.

The areas are as follows :—

	Whole Area.	Cultivated Area.
	Acres.	Acres.
1. Muhammadan patti	346.43	116.43
2. Hindú patti	351.79	162.65
3. Land of 11 small properties called milks.	22.99	10.56

Within each patti (share) there are a large number of sharers who have distributed the land between them, so that the tenure is really what is called bhaiachára, i.e., rights are represented by so much land, and not by a share in the profits of the whole patti.

The sharers themselves cultivate almost all the land in the Muhammadan patti; but in the Hindu patti, where the zamindars are rather less numerous, there are a good number of tenants who hold from the different zamindars, a field from one and a field from another, the land being broken up as before mentioned.

The whole population is 2,340; 1,845 agriculturists and 495 others. Of the agriculturists no less than 915 are landowners (or of the family of landowners); the other 930 are cultivators, many having, however, originally been landowners but having lost their rights.

The place was once of more importance than it is now, and the non-agricultural population was then larger than now.

The following list shows the detail of the 495 persons now resident :—

The Shaikhs and Chamars depend on day-labour for their livelihood; the bakkals are the same as banias. They are, as a rule, well off and lend money; but two women, whose husbands are dead, have to do spinning and other work for wages.

The subjoined statement shows the number in detail of non-cultivators residing in Dhabharsi :—

No.	Caste.	Total.	Males.	Females.	—
1	Shaikh	11	7	4	Day-labourer
2	Chamar	12	8	4	Ditto.
3	Sunar	14	6	8	Goldsmith.
4	Bakkal	105	54	51	Bania.
5	Brahman	15	8	7	—
6	Nai	6	3	3	Barber.
7	Bhurji	2	1	1	Grain-parcher
8	Dhanda	5	1	4	Weaver.
9	Kumedr	6	4	2	Potter.
10	Kaith	27	12	15	Writers, &c. patwaris, and kanungos.
11	Teli	5	3	2	Oilman.
12	Jotshi	6	2	4	Astrologer.
13	Fakir	2	1	1	Beggar.

The jotshis above mentioned are supposed to be able to predict the fortunate moment for commencing different kinds of work, and auspicious days for marriages, &c. They have now, however, descended to very near the level of common beggars.

As a rule, the people of this village are rather badly off; the soil is exceedingly poor, mere sand in many places, and their numbers are too large for the village. Only the banias seem really to flourish, with one or two of the most pushing of the sharers.

The following is an account of an ordinary day's work done by a cultivator :—

His name is Sewai Singh. He is a Taga of the same family as the zamindars, but not a sharer. He has a son, Khana, nearly grown up, and a wife.

He holds in Dhabharsi 24 bighas (about three and two-thirds of an acre), and also 68 bighas 9 biswas (about ten and a half acres) in Jatpura, a village close by. His rent in Dhabharsi is cash Rs. 6 12 annas, and in Jatpura batai, i.e., division of crops.

The value of what he gets from the land of course varies a good deal from year to year, but last year (rather a bad year on the whole) was, deducting his rent, which is one-third of the produce in Jatpura, Rs. 111 14s.

His expenses were :—

	Rs. a.	Rs. a.
Food for self and son	40 14	each, 81 12
For wife	36 4	„ 36 4
Total	118 0	

Cloth for self	7 0
„ for son	5 8
„ for wife	9 0
Total	21 8

His expenses were thus Rs. 139 8s., or Rs. 27 10s. over his income. This amount he borrowed without any deed being written at 24 per cent. He has not yet repaid it.

On the day taken as an example he got up at 6 (it was about the 18th January), and made a rope for his well out of munj fibre (munj is the top of the tall strong grass which grows freely on this sandy soil).

This took him till about 12, working easily. He then took his first meal, which consisted of half a seer of makka made into cakes and two chittaks of dāl. After this he rested for about an hour, and then took out his cattle to graze and drink. He brought them in about 4.30 p.m. and shut them up, supplying them with bhusa. After this he went out to see his rabi fields, and to have a talk with some neighbours. He returned home about 7, and his wife then prepared his supper, which was very nearly the same as his lunch, except that he took ghi instead of dāl. He went to sleep in his house at 9; he very seldom sleeps out at his fields till the rabi is ready for cutting.

His son was away on the day described.

His clothes are as follows :—

1. Cold weather (morning).	1. A dhoti of thick cloth.
	2. A mirzai or jacket of cloth.
	3. A chadar or sheet of rather thinner material.
Midday.	4. A kamal.
	Dhoti, mirzai, and a small pagri of cloth.
Evening.	Same as morning, with pagri.
Night.	Same as morning, except mirzai, and in addition a warm coverlet padded, and cotton wool.

The value of these is as follows :—

	Rs. a.	
Dhotis, two required, value	1 8.	Lasts a year.
Mirzai, one	0 9.	Lasts 6 months.
Chadar, one	0 10.	Lasts 9 months.
Kamal, one	1 8.	About 18 months.
Pagri, one	0 6.	About 6 months.
Razai, one	1 12.	About 2 years.

2. Hot weather same as in cold, except kamal and razai.

Mirzai is also made of thinner cloth; costs rather more—about 12 annas instead of nine annas.

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His wife wears the same clothes day and night; they cost more than his do, because they are dyed, and this requires to be done about every six months for those which are in constant use. She has a special set which she only wears on fair days, or other special occasions.

She fetches water from the well, cooks, takes care of the house, and takes out her husband's dinner when he is in the fields. She does not work in the fields herself, but she makes cakes of cowdung for fuel in the yard outside the house.

The following example of a day-labourer's life is from the same village:—

Karim Bakhsh, Shaikh, aged 43, has a wife and two sons—one grown up, the other about 12.

The elder son earns his own living, and is separate from the family; the younger lives with his father, and does what work he can to earn his bread. The expenses of the three—father, mother, and son—come to—

Food :	Rs. a.
Father - - -	21 8
Mother - - -	16 14
Son - - -	12 8
Total - - -	50 14

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The following are the results of inquiries of my own in four selected villages:—

No. 1.—A family of old hereditary cultivators, consisting of 5 men, 7 women, and 10 children.

Area of land held 294-4-0 village bighas or 73-11-0 Government bighas, or 46 acres.

Food grains raised in 1284 fasli - 191

Value of other produce:—

	Rs. a. p.
Cane - - -	203 1 6
Chari - - -	3 8 0
Cotton - - -	12 8 0
Value of crops not food grains -	219 1 6

Add net profits of a small zemindari holding (bigbas 5-1-8) in two small pattis - 44 0 6

Total income 191 maunds of food grain and - 263 1 6

and taking the consumption of the family as 134 maunds of farinaceous and 18 maunds of leguminous grain a year (an independent calculation which corresponds very nearly with the municipal average of 7 maunds per head per annum), there remain 39 maunds of grain and Rs. 263-1-6.

The other expenses of the family are as follows:—

	Rs. a. p.
Rent - - -	120 3 3
Hired labour in weeding -	20 10 0
Ditto reaping -	11 4 0
Ditto watering cane -	20 14 8
Ditto crushing „ -	41 4 6

(The rates of labour have been taken from Mr. Moens' settlement report.)

Salt - - -	12 0 0
Pepper - - -	5 0 0
Tobacco - - -	12 8 0
Clothes - - -	44 0 0

Herd boy (at an average of Rs. 2 a month) - 24 0 0

Total expenses - 311 12 3

Estimating the 39 maunds of surplus grain as worth Rs. 78, the net profits of the year will be Rs. 26-5-3; against this there have to be set extraordinary expenses, estimated as follows, within the last fifteen years:—

Six marriages - - -	700
Five funerals - - -	130

Cloth :	Rs. a.
Father - - -	2 8
Mother - - -	3 0
Son - - -	1 8
Total - - -	7 0

Altogether - - - 57 14

On the day selected (about 18th January), Karim Bakhsh and his son went out about 7.30 a.m., and weeded a field of one of the zamindars till 12; the field being near the village they returned home for dinner, and got between them 14 chittaks of bajra cake (i.e., rough cakes made of barley and gram); they returned to work at about 1, and weeded till 5; they got paid for this two annas between them, and with this bought some bajra and salt; they got about two seers of bajra and a small piece of salt. For supper they took the same as for dinner, using part of the salt, and putting away the rest of the salt and all the bajra for another day. They went to sleep about 8.30.

Karim Bakhsh has a dhoti (only one) worth about 10 annas, a mirzai worth eight annas, a chadár worth nine annas, and a thick kámal which cost Re. 1 Ga.

His son has a dhoti and a mirzai and chadár, but no kámal.

The clothes are made to last about a year, and the kámal about two years.

Karim Bakhsh's wife looks after the house and cooks the food, and also earns something by cleaning cotton and spinning.

The family are deeply in debt. One baniya has obtained a decree against them (April 1877) for Rs. 3,251-7-0, being the accumulated debt on account of Rs. 2,600 borrowed at 24 per cent. some eight years previously. This is to be paid off in yearly instalments of Rs. 500, and the first instalment has actually been paid with interest, leaving Rs. 2,751-7-0 due. In September 1876, Rs. 200 were borrowed from another baniya. Since then money has been borrowed as follows:—

21st July, 1877, Rs. 1,800 on mortgage of 64 bighas grove.

8th Dec. 1877, „ 1,000 on cane of all borrower's tenants.

29th Aug. 1878, „ 550 on mortgage of zemindari.

Various small sums, „ 207-5-0.

The Rs. 1,800 were partly spent in seed grain, partly in buying bighas 3-1-8 in another patti. Of the Rs. 1,000, Rs. 374-13-6 went to pay off an old debt, Rs. 361 in seed grain, and Rs. 264 in the November and December kists of revenue.

The Rs. 550 were used to pay the instalment of old debt noted above.

Total debt, Rs. 3,557-5-0, principal + 2,951-7-0, = 6,508-12-0, besides Rs. 100 interest.

The family used to keep two sugar boiling houses; for the last two years only one has been going. Failure of the harvest in 1868-69 and 1873-74, and again in 1877-78, is alleged as the cause of debt.

The house consists of two separate premises with a narrow lane between. The men's quarters contain four ceiled rooms, the women's six. There are also six thatched sheds.

All the walls are of mud. Counting the cost of each shed as Rs. 7, that of each ceiled room at Rs. 25, and that of the inclosure walls as Rs. 10 each, the value of the entire premises will be Rs. 312.

The family possess 15 bullocks, 7 cows, 5 calves, and 3 buffaloes (one female), also one plough. They have two carts and one light bullock waggon. The women's jewels are not valued at more than Rs. 10. There is no store of grain. After paying the interest on their debts the family have no surplus income.

No. 2.—The family consists of a man and his wife and three children, the eldest aged seven. They hold bighas 63-2-0.

Food grains of 1284 fasli -	54 mds.
Value of other crops (cotton) -	Rs. 7-13

The consumption of the family estimated at 2½ seers of farinaceous and ¼ seer of leguminous grain per diem is maunds 26-12 a year, leaving 27-8 + Rs. 7-13-0.

The other expenses are as follows:—

	Rs. a. p.
Weeding - - -	5 12 8
Reaping - - -	3 10 0
Salt - - -	2 4 0
Pepper - - -	1 8 0
Tobacco - - -	2 13 0
Clothes - - -	6 0 0
Total - - -	21 15 8
Rent - - -	24 3 0
Total charges -	46 2 8

Counting the 27-8 surplus maunds of grain as worth Rs. 54-6-0, the yearly net profit will be Rs. 8-3-4 + Rs. 7-13-0 = Rs. 16-0-4.

The cultivator has no occupancy rights. He has had no marriage or funeral expenses to pay, his own marriage having been paid for by his father, and his father's funeral expenses having been defrayed by his uncle. But he got into debt over the failure of his cane in 1874, and at present he owes Rs. 25 to one baniya and Rs. 150 to another. The interest on these debts leaves him no surplus income.

The house consists of two thatched rooms with an enclosure wall. The cultivator had two bullocks, which have died. He has two mattocks, worth one rupee each. His wife's jewels were pawned last year for Rs. 12. He has no store of grain.

No. 3.—This family consists of five men, four women, and six children (one a boy of 15, the rest from seven years downwards).

They hold bighas 123-16-0, and the produce of 1284 fasli is estimated as follows:—

Food grains - - -	102 maunds.
Value of other crops—	
Cane - - -	231 0 0
Chari - - -	7 8 0
Flax - - -	15 8 0
Total - - -	254 0 0

Taking the average consumption as 10 seers a day of farinaceous and one seer of leguminous grain, the annual consumption will be 100 maunds for the whole family.

The other expenses are as follows:—

	Rs. a. p.
Weeding - - -	21 4 0
Reaping - - -	12 0 0
Watering cane - - -	19 2 2
Crushing cane - - -	38 4 9
Salt - - -	7 0 0
Pepper - - -	3 12 0
Tobacco - - -	12 8 0
Clothes - - -	19 0 0
Total - - -	132 14 11
Rent - - -	104 8 0
Total expenses -	237 6 11

Deducting the consumption and expenses, there remain 2 maunds + Rs. 16-9-1; or reckoning the grain at Rs. 4, the net annual profit is Rs. 20-9-1.

Nevertheless, the cultivator is in debt to the extent of Rs. 100, caused by the failure of last year's cane. His creditor as usual is the sugar boiler. He has always been in debt to him off and on, according to the seasons.

There are eight rooms in the house, four cattle sheds, two bhusha sheds, and one small sitting room. All the walls are of mud and the roofs of thatch. The whole premises would cost about Rs. 110 if new.

The cultivator owns six bullocks, two cows, one calf, one he-goat, and one she-goat. He has about four maunds of kharif grain in store. He pawned his cooking pots for Rs. 12, and his women's jewels for Rs. 20.

There have been three marriages within the last ten years, costing on an average Rs. 15 each.

No. 4.—This family consists of two men, two women, and two children (aged 10 and 5).

They hold bighas 24-16-0 (village). The food grains of 1284 fasli on this land were 32 maunds.

	Rs. a. p.
Value of cane - - -	42 0 0
„ of vegetables - - -	15 0 0
„ of cotton - - -	2 7 0
„ of flax - - -	1 9 3

Estimating the consumption of the family at 3½ seers of farinaceous and ½ seer of leguminous grain a day, the total annual consumption will be 36½ maunds a year.

The other expenses are:—

	Rs. a. p.
Rent - - -	32 8 0
Salt - - -	2 8 0
Tobacco - - -	5 8 0
Clothes - - -	8 0 0

Total 36½ maunds grain + Rs. 48 8 0

Or taking the deficit of 4½ maunds as equivalent to a debt of Rs. 9, the expenses, other than mere food, will be Rs. 57-8-0 against an income of Rs. 61-0-3, leaving a surplus of Rs. 3-8-3 a year. The cultivator owns two bullocks; he lives in a mud house with three thatched rooms, two of which are roofless; and he is in debt to several petty local banyas; but he professes ignorance of the total amount of his liabilities, which have been going on now for eight or ten years. His daughter's marriage about four years ago, cost Rs. 5; it was by "dola." His wife has no ornaments. The debts leave him no surplus income, nor has he any store of grain.

No. 5.—This family consists of 4 men, 5 women, and 11 children (two of 15, one of 12 years, and the rest from 10 downwards).

They hold village bighas 185-4-0, and the out-turn of food grains on this in 1284 fasli was 241 maunds.

	Rs. a. p.
Value of cane - - -	319 12 0
Do. of cotton - - -	1 0 0
Do. of chari - - -	38 14 9
Do. of flax - - -	3 2 3
Total - - -	362 13 0

Taking the consumption of the family at 122 maunds a year, we have for other expenses:—

	Rs. a. p.
Weeding - - -	35 0 0
Reaping - - -	28 0 0
Watering cane - - -	43 12 0
Crushing „ - - -	87 8 0
Salt - - -	9 8 0
Pepper - - -	5 0 0
Tobacco - - -	11 0 0
Clothes - - -	42 0 0
Servant - - -	24 0 0

Oil (2 chittaks a day at 3 seers per rupee) - 15 0 0

Meat (every 3rd day 4 annas worth) - 30 0 0

Rent - - - 330 12 0

Total - - - 69 2 9

Total - - - 399 14 9

To meet this expenditure there are Rs. 362-13-0 + Rs. 238, the value of the 119 surplus maunds of grain; total Rs. 600-13-0.

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This leaves a net profit of Rs. 200 a year. The reason of this large profit is that the greater part of the land held is khudkasht zemindari. Besides the above profits from cultivation, the profits from rents in the 12½ biswanchas in question are Rs. 61-13-9 for this family, making the entire yearly profit Rs. 307-13-9.

The house has four dwelling-rooms, three small cook-houses, four large byres, and a covered doorway, all of mud with thatched roofs.

The cattle are eight bullocks, one cow, one calf, one she-goat.

There is one light cart for field work.

Grain enough was saved from the rabi to last the family till the kharif harvest; there is no further store.

The women have a very small amount of jewels, valued at Rs. 5.

The family are indebted: Rs. 500 to one money-lender, Rs. 600 to another, and Rs. 225 to a third. These are all old standing debts. The interest at 24 per cent. would be Rs. 318 a year. The cause of debt was bad seasons, and marriages helped them. In the last six years there have been three marriages, costing Rs. 430, and one funeral, costing Rs. 60. The interest of the debts leaves no surplus income.

No. 6.—This family consists of a man and his wife and four sons (one aged 12, the rest from eight years downwards).

They have a one-third share in bighas 12-4-0 by occupancy tenure, besides bighas 8-4-0 by non-occupancy tenure. The out-turn of food grains in 1284 fasli was maunds 23-12.

	Rs. a. p.
Value of cane	- 30 0 0
Do. of cotton	- 2 12 0
Do. of chari	- 2 12 9

Estimating the consumption of the family as that of three and a half full-grown men, or 25 maunds a year, the remaining expenses may be put down as follows:—

	Rs. a. p.
Watering cane	- 2 8 3
Crushing "	- 5 0 0
Salt	- 1 12 0
Pepper	- 0 12 0
Clothes	- 5 0 0
Rent	- 13 8 0
Total	- 28 8 3

This leaves a cash surplus of Rs. 6-0-6, out of which Rs. 2-8-0 have to be deducted on account of the deficiency in grain, leaving a net annual surplus of Rs. 3-8-6. These profits have to be divided with the cultivator's two brothers, who live apart and support themselves by labour. The house consists of one thatched room. All the household property—it was only a lotah and a brass dish—has been sold; there remain a buqqa and some earthen pots. The cultivator has two bullocks and a she-goat. His wife has no ornaments. His children have no clothes. They have no store of grain.

The family are always more or less in debt on account of the expenses connected with cane cultivation. The present debt is Rs. 16, borrowed last year at 24 per cent. The interest on this swallows up the annual surplus.

No. 7.—This family consists of a man, his wife and mother, and one child 2 years old. He owns a small zemindari, from which he got in 1284 Fasli, with the produce of a grove, temple, and fishery dues, Rs. 135-9-11, paying Rs. 55-14-3 revenue and cesses. Besides this, cultivated bighas 99-16-0 of sir land, the out-turn on which was as follows:—

	Mds. s. c.
Food grains	- 89 20 0
Value of cane	- 409 10 0
Do. of flax seed	- 16 0 0

There is a herd-boy who gets his board and lodging, and there are two servants, who get part board. Taking the consumption of the family as equivalent to four full grown men, i.e., 35 maunds a year, the other expenses may be reckoned as follows:—

	Rs. a. p.
Weeding	- 12 6 5
Harvesting	- 12 0 0
Cane seed at Re. 1 the village	
bigha	- 29 3 0
Watering cane	- 38 15 3
Crushing	- 77 15 0
Salt	- 2 8 0
Pepper	- 1 8 0
Tobacco	- 2 13 0
Clothes	- 8 0 0
Servant's wages	- 63 0 0
Total	- 247 4 8

The land being all sir, the nominal rent has been allowed for in calculating the profits on the zemindari. Thus, the annual surplus is Rs. 178-5-4+54½ maunds of grain, or approximately Rs. 287 altogether.

The premises consist of two distinct enclosures with a lane between them. One consists of a courtyard and a byre, and one room for the cow-keeper in the doorway. The other has three ceiled rooms, one of which contains bhusa, one is occupied as a dwelling-house, and one is empty. The enclosure of the cattle-yard is ruinous. All the walls are mud.

Besides the bhusa (about 400 cubic feet), there are about 10 maunds of grain in store. The women have holiday clothes worth some Rs. 20, and jewels estimated at Rs. 15. There are brass cooking utensils in the house. The cattle are four bullocks and one buffalo-cow. There is one light bullock waggon.

The marriage of the head of the family, four years ago, cost Rs. 150.

In spite of the large apparent profit, the cultivator has been in debt for the last six years. Two years and a half ago a decree for Rs. 150 was obtained against him, and to pay off this and also a debt to another baniya he borrowed Rs. 700 in May 1876, at 24 per cent., mortgaging his zemindari. He was already in debt to this man in Rs. 100, borrowed eight months previously. Hitherto this latter sum has been paid by placing the lender in possession of a ten-bigha field for the last two years. On the Rs. 700 no interest has been paid yet. The sum due is now nearly Rs. 1,000, and the interest on it would absorb nearly all the annual surplus income. Cause of debt, bad seasons.

No. 8.—This family consists of a man and his wife, three sons (12 to 5 years), and one daughter of 15, married, but not gone home to her husband. They have a one-fourth share in 13½ biswanchas, bringing in Rs. 15-13-4 as profits in 1284 fasli. They have also a one-fourth share in bighas 192-8-0 sir land, besides bighas 27, rented at Rs. 14-10-3. The outturn on this land belonging to the family in 1284 fasli was as follows:—

	Mds. s. c.
Food grains	- 81 11 4
Value of chari	- 11 5 0
Do. of cane	- 67 8 0
Do. of flax	- 13 0 0
Do. of cotton	- 6 0 0

Counting the part board of two servants, the consumption of the family may be estimated at 45 maunds a year. The other expenses are as follows:—

	Rs. a. p.
Weeding	- 3 13 0
Harvesting	- 9 10 0
Watering cane	- 5 7 6
Crushing "	- 10 11 0
Salt	- 3 0 0
Pepper	- 2 0 0
Clothes	- 15 0 0

	Rs. a. p.
Servants' wages	- 60 0 0
Tobacco	- 3 8 0
Rent	- 14 10 3
Total	- 127 11 9

Against this there is a cash income of Rs. 27-13-0 + 36½ surplus maunds of grain, so that the net annual surplus will be Rs. 40-1-3.

The house consists of three ceiled rooms with a thatched verandah (one of the rooms is in the door-

way), and one byre; all the walls are mud. One of the rooms is the dwelling-house. About 15 maunds of grain are in store from the rabi harvest. The cattle are 3 bullocks, 7 cows, 4 heifers, 6 sheep.

The women are utterly destitute of jewellery.

The family have been in debt since before the mutiny.

The daughter's marriage the year before last cost Rs. 250. Rs. 100 were borrowed last year, and Rs. 400 were owed before that. The interest on this at 24 per cent. would swallow up the annual surplus.

All persons acquainted with the district agree that the economical condition of the cultivators is on the whole good; that the industrious and frugal can rise to comparative wealth.

Exemplar No. 1.—Karagjit, son of Kesri Chamar,

of Narauli, holds 22 bighas 5 biswas pukka (about 12½ acres) of land at a rent of Rs. 53 8 0. In his house live his two sons, two grandsons, wife, two daughters-in-law, and daughter. His holding is divided as follows:—

Crop produced.	Area.	Average Amount of Produce.	Value of produce in ordinary years when good rain falls.
	B. bis.	Mds. s.	Rs. a.
Juar	- - -	5 0	22 20
Bajra	- - -	6 6	30 0
Cotton	- - -	2 10	5 5
Til, tili	- - -	1 10	3 12
Urd and mung	- - -	2 20	6 4
Wheat	- - -	1 15	12 30
Bejhar	- - -	5 0	30 0
Chana	- - -	1 10	5 10
Sarson	- - -	1 0	3 0
Arhar	- - -	10 0	10 0
Carrots	- - -	0 4	50 0
Total	22 5	170 45	209 10

Expenses for ploughing, weeding, watering, the cultivator reckons at Rs. 32 per year. Expenditure for necessities not produced on the holding he reckons at Rs. 30 a year for clothes, Rs. 4 for gur, Rs. 4 for condiments, Rs. 6 for salt for the whole family. His house is built of mud, contains three rooms, a room just inside the doorway, called a barota, and a thatched shed. Has one separate shed for his cattle, ploughs, with an ox and buffalo bull; he has no other cattle except one buffalo calf (male). He states he has no store of grain and saves nothing. Only owes Rs. 40 which was advanced to him for seed; but his fields having been dried up, he was unable to repay it. Is unable to account, or will not account, for the surplus which remains, after paying his rent and after (other necessary expenditure, of his profits from his crops. His possessions consist of two brass dishes (thalis), one brass vessel called a bela, two called lotahs, one iron pan called a karahi, one called a tawah, one called a karchi, one pipkin called a kunra, eight charpais, ornaments, four pairs brass amouts, one seer weight of brass karras. Besides this he has six baskets, two handmills, two sieves, one plough, one well-rope, one water-skin, one phaura, one kudari, three khurpis, two hansias, two garasis.

Exemplar No. 2.—Sukhi, son of Dya Ram Lodhi, of Lodhpura, Muhabbatpur, cultivates 8 bighas 6 biswas at a rent of Rs. 53. Three sons, one brother-in-law, one wife, one sister-in-law, one daughter-in-law live with him. His holding is divided as follows:—

Name of Crop.	Area.	Amount of Produce.	Value in Money.
	B. bis.	Mds. s.	Rs. a. p.
Juar	- - -	3 30	5 0 0
Cotton	- - -	1 0	4 0 0
Sugarcane	- - -	5 0	20 0 0
Maize	- - -	1 10	1 4 0
Wheat	- - -	20 0	40 0 3
Bejhar	- - -	12 20	16 10 0
Opium	- - -	0 6	24 0 0
Poppy-seed	- - -	2 20	5 0 0
Indigo	- - -	150 6	25 0 0
Sarson	- - -	0 2½	0 3 0
Carrots	- - -	10 0	2 0 0
Total	11 0	—	143 1 0

i.e. of the 8 bighas 6 biswas holding, 2 bighas 14 biswas are double-cropped.

He reckons his expenditure in wages at Rs. 20, in clothes at Rs. 20, salt Rs. 5, condiments Re. 1, oil Rs. 3, dal Rs. 3; total Rs. 42.

His house is mud, containing two rooms and one shed and a cattle shed. Of cattle he has one ox, one buffalo bull, and one buffalo calf. He states he has saved no grain; that he owes Rs. 25, which he borrowed when the rain failed last year. Also states that he saves nothing, and ekes out a livelihood by odd jobs of field work. He owns two thalis of brass, two belas, three lotahs, one karahi, one tawah, one karchi, one wooden trough for pounding grain, six charpais, four baskets, one stone hand-mill, one plough, two baskets for lifting water, one phaura, four khurpis, two hansias, one garasi.

Exemplar No. 3.—Kanhai, son of Khaggi Kachi, of Sultanpur kalan, holds 19 bighas 13 biswas at a rent of Rs. 58 8 0. With him live one son, one mother, one wife, one sister-in-law. His holding is divided as follows:—

Name of crop.	Area.	Amount of Produce.	Value in Money.
	B. bis.	Mds. s.	Rs. a. p.
Juar	- - -	3 15	18 30
Bajra	- - -	1 15	9 15
Cotton	- - -	2 15	9 30
Mukka	- - -	1 10	6 10
Til tili	- - -	1 10	3 12 0
Marua	- - -	10 0	1 20
Urd and mung	- - -	2 20	6 4 0
Rausa	- - -	2 0	4 0 0
Wheat	- - -	2 15	15 0
Bejhar	- - -	5 15	30 0
Sarson	- - -	2 0	6 0 0
Schuan	- - -	0 10	0 8 0
Alsi	- - -	1 0	3 0 0
Carrots	- - -	0 3	50 0
Muli	- - -	0 3	30 0
Egg-plant	- - -	0 9	24 0
Arhar (under-cotton)	- - -	12 0	20 0 0
Chana	- - -	2 3	8 0
Total	21 13	—	249 8 0

Of these 21 bighas 13 biswas 20 bighas are twice-cropped. He reckons expenditure on wages at Rs. 40,

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AP. I. QN. 9. on salt Rs. 6, gur Rs. 6, condiments Rs. 3, clothes Rs. 20; total Rs. 75. His house is of mud, and contains two rooms, one thatched shed, one entrance room called barota; the cattle live in one of the rooms of the house. He has two oxen, one buffalo cow, one buffalo calf. He states he saves nothing and stores no grains. He owes Rs. 100, which he was obliged to borrow some years ago for seed and household expenses, hail having ruined his crop. His property consists of two thális, two belas of brass, one karchi of iron, one iron tawah, one spoon, one karehuli, one brass pot (batua), one small bela, one wooden trough, one belan of wood, five charpais, one pair of silver karras worth Rs. 3, five seers of brass ornaments, three lotahs of brass, five baskets, one stone hand-mill, one sieve, one plough, one well-rope, one water-bag, one phaora, one kudári, three kurpus, two hansias, one garasi.

Exemplar No. 6.—Debi Kachi, of mauza Mamun, holds 23 bighas 4 biswas at a rent of Rs. 92, but besides this he pays Rs. 22 for canal irrigation. With him live two sons, two daughters-in-law, three grandsons, three grand-daughters, and one brother. His holding produces 22½ maunds of wheat, 26 maunds of bejhra, 15 maunds of joár, cotton 2 maunds, 3 maunds of bájra, worth Rs. 201 on an average. He pays Rs. 10 for condiments, and, he states, Rs. 20 for wages, but the latter is probably an over-estimate, as his

family is so large. His house is of mud with four rooms and one large three-doored room and one barota. His cattle are four oxen, two cows, two goats, which live in his house. He has two thális, four belas, three lotas, one tawah, one karchi, one karáhi, one spoon, one hand-mill, nine beds, one phaora, furniture. His cattle live in his house. He states he saves nothing, but is not in debt; that he was lately, but has now paid it off.

Exemplar No. 8.—Gauri Shankar Brahman, of Lachiaman, has a holding of 26 bighas 4 biswas at a rent of Rs. 69–5–0; but besides this he holds 2 bighas 9 biswas as a sub-tenant at a rent of Rs. 10–8–0. Of this land he keeps generally one bigha or so grass for his cattle. With him live his father and mother and a wife and brother and sister-in-law and a daughter. He grows about 100 maunds of grain, Rs. 10 or 12 worth of cotton, and the like of sugarcane, worth in all Rs. 220 or 230. Besides his family he keeps two servants, which cost him about Rs. 36. In miscellaneous expenses he spends Rs. 10. His house is of mud with four rooms, the cattle living in the house. He has five oxen, one buffalo cow, one buffalo cow calf, and one mare and one foal, and one cow and a bull calf. He has the same furniture as the exemplar already stated. He has 10 or 12 maunds of grain stored. He owes nothing whatever.

Mr. Wright. *Daily Life and Circumstances of four Cultivators in a village of Cawnpore.*

Example 1.—Maikua, a Káchi, cultivates seven acres and pays a rent of Rs. 50. He is only a sub-tenant, and has no occupancy rights, having lost the land which he had some years ago. He has a wife, a boy aged 10 years (Babbua), another 1½ years, an infant son, and a daughter aged six years, also a nephew (Madári) aged 12.

Food.—From June to September he lived on the bejhra (mixed barley and peas) remaining from his last year's spring harvest. From September he began to live on his kákun (millet, *Panicum Italicum*) till the middle of October, when he began to pull the ears of joár (large millet, *Holcus sorghum*); this lasted for a month, when the joár was ripe; and he intended to live on that till the spring harvest. Every day 6 lbs. grain are cooked for the family, of which Maikua eats 2 lbs., his wife 1½ lbs., and the children between them 2½ lbs. He always eats salt and arhar dāl (*Cytisus cajan*), if he can get it, but it has been so dear that he has not eaten any since last June. Instead he eats greens, the ordinary sag (potherb) or bathui (*Chenopodium album*), which grows wild in the fields, or mustard leaves and stalks, whatever is in season. His baigans (*Solanum melongena*) were bitten by frost.

Clothing.—Every year Maikua buys himself a pair of dhotis (waist cloth) costing Re. 1 8 or 3s., an angochha (headcloth or pagri) costing 1½ annas or 2d., and a pichhora (wrap) costing 9d. (6 annas). His wife has a petticoat (lehnga) costing 2s. (Re. 1) and a shawl (lugra) costing 9d. (6 annas). The eldest boy has a wrap (pichhori, notice the diminutive feminine form of the word) worth 6d. (4 annas), a dhoti worth 3d. (2 annas), and a little jacket (mirzai) worth 9d. (6 annas). The second boy a little coat worth 3½d. (1 anna), and the daughter a little petticoat worth 4½d. (3 annas), a small shawl worth the same, and a little jacket made up of the old clothing. Last June Maikua bought his wife a petticoat at Lalpur bazar, for which he gave 2s. (Re. 1), selling some grain at the same bazar to pay for it.

Jewellery.—His wife has a nose-ring of gold worth 10s. (Rs. 5), a broken necklet of silver worth the same, and some pewter rings for ankles, wrists, and toes, worth a rupee at the outside. But she has her little vanity in a box of antimony for the eyes and another

of red paint for the part in her hair. The eldest boy has a pair of silver bracelets made for him by his aunt, worth some 4s. (Rs. 2) and a pair of anklets worth 18s. (Rs. 9).

Utensils.—A brass lota (drinking or cooking cup) worth 3s. (Re. 1 8), a brass dish (thali) worth the same, and a brass pot (batloi), also worth 3s., comprise his plate; an iron pot, spoon, and plate (táwa), on which he bakes his chapattis or unleavened cakes, worth altogether a little more than 4s. (Rs. 2), some wooden platters, a kneading trough and rolling pin and stone pickle jar, with some 18d. worth of earthen pots, complete his kitchen arrangements, the whole not worth more than one sovereign. A couple of beds made up at home of string made from káns grass (*Saccharum spontaneum*), a cot for the children, a wooden stool, and a box for his clothes, form his furniture; two pairs of wooden doors, worth 12s. (Rs. 6) his personalities.

Plough Cattle.—He has two—one bought last year for 3l. 4s. (Rs. 32), a five year old; the second, six years old, bought last November for 3l. (Rs. 30), when the pair to the first one died. He had to borrow to pay for both at 24 per cent., but has paid off the price of the first one.

Agricultural Operations.—This last year he sowed an acre of cotton which gave him 84 lbs. (uncleaned), for which he got 12s.; he also got 80 lbs. of joár from the same field. The arhar (*Cytisus cajan*) was bitten by the frost. An acre and a half of joár gave him 480 lbs. besides what he ate unripe. He also got 120 lbs. kákun (*Panicum Italicum*). He has borrowed 240 lbs. of joár to eat, for which he will have to pay in bejhra (mixed barley, gram, and peas) at the rate of 150 per cent. He borrowed 18s. to add to what he got for his joár (20s.), and his cotton (12s.) to pay his half year's instalment of rent, or 2l. 10s. He borrowed the seed for his spring crops, 100 lbs. of wheat for an acre of land, 180 lbs. bejhra for 2½ acres, and 80 lbs. gojai (mixed wheat and barley) for an acre, which he will have to pay back after harvest at 125 per cent.; besides which he owes still for the price of one bullock.

Account of One Day's Operations.—The incidents of one day at his well were as follows:—About 8 a.m. Madári, the nephew, brought the cattle and about 8 lbs. wheat chaff in a basket, and standing the cattle in the

khuriya, or lower part of the run, went to cut some joár. About 8.30 a.m. Maikua came with the yoke and rope, and his little son Babbua brought the bucket; they then made a new lash for the whip, oiled the wheel, fixed it, yoked the bullocks, and started work. Madári, who was at the chulár, or receptacle on which the bucket is emptied, got some of the ripe fruit of the kaukuria (?) and rubbed it on his feet to prevent their cracking when the water was emptied over them. Maikua drove the cattle, Babbua distributed the water in the field. The cattle were watered about 10 a.m. or 11 a.m., when Babbua (whose real name was Gurdyál) pulled and brought some carrots (2 lbs.) to the well, which he and Madári ate. About 1 p.m. Maikua's wife brought a lota (brass cup) of buttermilk which she had begged of a neighbour, and 10 ozs. satu, or the flour of parched barley, and 5 lbs. boiled carrots, which Maikua ate for his dinner, giving a share to the lads. Meanwhile the cattle ate the chaff and some dried (by frost) arhar leaves mixed with it. Maikua then had a smoke and started work again. This time Maikua emptied the bucket, and Madári drove the cattle. Work was knocked off about 6 p.m.

The well was an earthen one, for one pair of bullocks, dug some 20 years ago, and not cleaned out for the last ten years. It was supplied by filtration, and the sides were held up by kháre (arhar stalks). The depth to water taken at morning was 3½ feet, at evening 7½ feet. The water was taken 250 feet to the field. In one hour (11.20 a.m. to 12.20 p.m.) 43 buckets were counted as being lifted; in the day 300 were lifted, watering an area of 4 biswas 11½ biswas, or rather less than ½ of an acre. In the measured hour 646 square feet were watered, getting 2½ inches of water. The bucket contained 147 pints imperial=18 gallons 1 quart 1 pint.

Maikua owns a plough, which cost him 1s. 9d. for what he had to purchase (share 6d., beam 1s. 3d.); a leather bucket which cost him 6s. 6d., and its appurtenances another 2s. His rope cost him 3s., pulley 1s. 9d.

He gives the blacksmiths for repairs 2s. a year and 10 lbs. grain off his heap on the threshing-floor, the washer man another 10 lbs., and the barber 1s. per annum.

He lives in a house of two rooms with a thatch thrown out in front to keep off the driving rain; his lintels cost him 7s., and the scantlings for his roof 8s.

The only festival he can remember of late years was the birth of his firstborn, when he spent 30s. in making merry.

Example 2.—My next instance is that of a cultivator fairly well-to-do, and higher in the social scale than Maikua.

Pattu, a Brahman, cultivates 21 acres, paying an annual rent of 10 guineas, with a right of occupancy. His family consists of himself, his brother, three women, a son aged six years and a daughter nine years. He could not say what food he had cooked every day, but he was living on the produce of last spring harvest, from which also he paid his three servants (nominally getting 4s. 6d. per month each), and hoped to be able to feed them and his family till next spring harvest. He also sowed his fields out of his private grain stores.

Clothing.—The quantity of clothing actually used by Pattu and his family was much the same for each individual as used by Maikua, differing only in quality. But he has a wardrobe of better clothes stored away for festivals, &c. Thus each man has annually his pair of waistcloths costing 4s., his wrap costing 1s. 3d., his pagri 9d., and a jacket of dyed cloth worth 2s. 3d. The married women have their petticoats worth 3s. each, shawls worth 4s. each. The widow only has a pair of dhotis, which she wears like a sári, costing 4s. But in addition to the above there are a pair of sheets of country cloth (4s.), a pair of common wraps (2s.), a waistcloth of American drill (1s. 6d.), a pair of best waistcloths for visits, &c. (5s.), a good double wrap (4s.), a jean jacket (1s. 6d.),

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two good shawls of jean (3s.), a pair of turkey red petticoats (10s.), a purple sári of silk (5s.), a chintz shawl (4s.), and a cloth wrap worth 12s., bought by the brother when he was in the army. They have also a pair of quilts (18s.) and a mattress (10s.). Of his last crop of cotton Pattu has made six pairs of waistcloths (dhotis), of which two pairs will go to the men for daily wear, and from the remainder three wraps will be made. As a rule Pattu and his family never wear English cloth.

Jewellery.—The widowed mother has about 16s. worth of silver bangles on her arms. As a Brahman widow she discards at the funeral ceremonies all but these ornaments, and for the future wears neither nose-ring nor foot ornaments. The married women have each about 2l. worth of silver ornaments and a gold nose-ring worth 1l. But for common wear 2s. worth of pewter ornaments are enough. The boy has bracelets and anklets worth 1l. Most of these ornaments were made out of the profits of ghi, made and sold by the women, of which they sell about 4s. worth per month, and from it also buy extra food for the milch cattle, and condiments and spices for domestic use.

Utensils.—Here, too, Pattu is well off.

	Value. s. d.
2 large dishes of bell-metal (being a Brahman he does not use brass)	8 9
1 very large dish of brass for festivals	8 0
3 bell-metal saucers	7 0
1 brass saucer	1 6
2 little brass saucers	1 0
1 large brass vessel	4 6
1 still larger vessel (párat)	8 0
2 spoons of brass	1 3
2 brass cups (lotah)	4 3
1 cup of bell-metal	5 0
1 brass cup (abkhora)	1 0
1 very large brass vessel (kalsa)	10 0
2 iron cauldrons and two iron spoons	8 0
1 iron bucket	2 3
A wooden kneading trough and stone rolling board and a wooden roller	1 4
Two stone jars for pickles, buttermilk, &c.	8 6

and about 18 earthen pots of sizes, or about 8l. worth of kitchen utensils, to which should be added a pair of millstones for grain, and a smaller pair for splitting pulses, and a cotton gin and spinning wheel used by the women folks.

Agricultural Stock.—Pattu has two pairs of oxen: one pair he bought five years ago for 7l. 4s.; another pair he bought 10 years ago for 4l. 18s., of which one died and was replaced by a home-born calf. Before the mutiny he had a cow buffalo worth 1l. 17s., and bought a second two years after for 1l. 12s., from which he has had two calves, which now give milk, having sold the old ones for 2l. 16s. Last year his father-in-law gave him a cow and a heifer; the cow ran off, but the latter one gives milk regularly. He has two ploughs which cost 5s. each, two yokes costing 1s. each, a clod-crusher, 4s.; a spade, 2s. 3d.; two hoes, 9d.; three sickles, 11d.; two choppers, 2s.; an axe, 6d.; two leather buckets for the well costing 10s.; a couple of ropes, 8s.; and a cart which cost him 3l.; bullocks' clothing, 2s.; and a piece of sack to hold the grain in the cart worth 10s.

Agricultural Operations.—Pattu does not put hand to the plough himself, so keeps three ploughmen at 4s. 6d. each per month. This year he has put in 5½ acres of joár and 4½ acres cotton. The former gave him 2,952 lbs. grain and 276 lbs. sesamum seed. There was no undergrowth of pulses, and his arhar was destroyed by frost. From the cotton he only got 94 lbs. of clean cotton. Eleven acres he has put down in wheat and bejhra, which he is now watering. There is enough and to spare of fodder still standing in the fields, and plenty of grain in pits for consumption till the next harvest.

Incidents at the Well.—Pattu's well was dug 32 years ago, and is cleaned out and kept up with new binders every third year: it cost originally only 1l. 10s. to make. As is a common custom, the well

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was being worked turn-and-about by Pattu and another cultivator called Rája, each helping the other with their cattle and gear. This plan is called sámpar or jíta, and accounts for the very small cash expenditure which is demanded from the cultivators. About 10 a.m. Pattu brought the well gear in a cart, two of his bullocks dragging it, two following it; he took the gear of one bucket to another well belonging to a friend, with whom also he had a jíta arrangement. Then Lachhua and Binda, two of the ploughmen, came, and Rája brought in gear and three oxen, one borrowed.

The ploughmen drove the cattle, Rája emptied the buckets. From the first bucket a few drops are sprinkled into the well, and a prayer offered to the local deities for a favourable day's work. About 1 noon Pattu's bucket burst, when Lachhua took Binda's pagri, and stuffed it in the hole. It again burst in another place, when work was stopped for an hour, whilst Lachhua tried to get another bucket, but failing, he took the pagri off a lad standing by and stuffed it in the hole. Rája's father distributed the water in the field. About noon Pattu's brother brought 1½ quarts buttermilk and gave it to the ploughmen; and after this Rája's nephew brought 1½ lbs. joár porridge, which was divided between Rája and his father and Binda. Lachhua's brother then brought two thick unleavened cakes of joár and the leaves of gram as a vegetable cooked with salt. They all ate without stopping the work; the lad whose pagri had been taken helping. Work was knocked off about 6.30 p.m.

Duty.—Owing to the above mischances only ¾ths of an acre were irrigated in the day from the three lifts. The water from the two lift well had to travel 823 feet to reach the field to which it was taken, from the single lift well only 120 feet.

Example 3.—Prágdatt is a Brahman cultivator with right of occupancy in 11½ acres, for which he pays an annual rent of Rs. 46, or 4l. 12s. His family consists of himself, his mother, wife, and infant child.

Food.—During the past year they have lived on the produce of their land, keeping from last harvest 246 lbs. of wheat and 1,230 lbs. of gojai (mixed with wheat and barley). Every day 5 lbs. of flour are cooked for the family, from which one cake (chappatti) is given to the kahárin or water-carrier, and one to the gwála or cowherd who comes to milk the cows. Up to the middle of November the wheat and wheat and barley were eaten, then some joár flour were mixed; and from the autumn harvest 820 lbs. joár and 82 lbs. rice were put by, which will carry on till next spring harvest. With his cakes he eats the pulses of arhar (Cytisus cajan) or urd (Dolichos pilosus), which costs, bought at the nearest bazar, 18d. a month. Milk is always going in his house, for he has a cow-buffalo and a goat. Greens as usual (bathui, mustard leaves, and ság).

Clothing.—Prágdatt himself purchases every year a pair of waist cloths value 3s., a common jacket, 1s. 6½d.; a chintz jacket, 2s. 3d.; a common wrap (pichhora), 1s. 3d.; and every other year a thick wrap (dohar), costing 5s. His mother gets a pair of waist-cloths every year costing 3s. 6d.; his wife a petticoat, 2s. 6d.; a shawl, 3s.; a bodice of chintz, 1s. 9d.; and every other year a pair of shawls, English cloth, costing 5s. per pair. She has also a muslin shawl which cost 1s. 3d., two best petticoats from Bhágalpur, which she has to keep four years in store before wearing, costing 8s., and a turkey red shawl worth 3s. Prágdatt has a jean coat for weddings which cost 1s. 3d., and a warm woollen wrap costing 4s., a present from Mathura, given to his mother. Three quilts, 15s.; a mattress, 3s.; and a pair of darris (carpets) costing 4s., make up the rest of his household linen, on receiving which he spends about 1l. 14s. per annum.

Jewellery.—The wife has a nose-ring worth 2l., which was worth only 1l. 4s. when she bought it with her at her wedding, but which has been enlarged from the sale of some cotton a couple of years ago; also a pair of silver bracelets now worth 1l. 4s.; a necklace of whole rupees (hamel) worth 1l. 10s., a

wedding present; and a pair of armlets worth 16s. The mother has a pair of armlets, 16s., a pair of bracelets, 12s., and a solid necklace worth 1l. 6s. On the child are a pair of bangles worth 16s., given him by his maternal grandfather. For common wear 2s. worth of pewter ornaments suffice; as a little money is over, Prágdatt adds it into jewellery.

Utensils:—	s.	d.
Two large brass vessels -	10	0
Three lotas (cups), brass -	7	0
Two brass saucers -	5	0
One drinking cup (abkhora) -	1	4½
One brass spoon -	0	9
One larger brass platter -	6	0
Two smaller -	2	0
One of bell-metal -	5	0
An iron cauldron -	6	0
An iron spoon -	0	3
An iron bucket -	2	0
Odds and ends of stone and wooden utensils -	3	0
Earthen vessels of sizes -	4	0

But he pays the potter 2s. a year for what he wants. A large pair of millstones for flour and a smaller for splitting pulse, a set of weights and scales, three beds and a cot form the sum total of the household furniture.

Agricultural Stock.—A plough which cost 3s. 4½d., and of which the share has to be renewed every year; a yoke, 1s.; a spade, 3s.; four axes at a shilling each; a couple of sickles worth 7d.; a leather bucket for the well which cost altogether 8s.; a rope, 4s.; a pulley, 1s. 3d.; a clod-crusher, 4s.; and a large piece of coarse matting to hold chaff form his dead stock. His live stock consist of a pair of oxen which he bought last year for 10l., part of which he paid from the sale of his old oxen, 6l. He bought a cow-buffalo six years ago for 2l. 10s. (which he had to borrow, but has paid back); this died, but left a calf, which now gives plenty of milk; so that he can sell some 6s. worth of ghi in the month. He also has a goat. From June to August the latter were fed on chaff from last spring harvest, then till end of September on the grass from the fields, and till next harvest they will get the millet stalks for fodder.

Agricultural Operations.—Last year Prágdatt had an acre under wheat, an acre and a half under wheat and barley (mixed), and 3½ acres under barley and peas (mixed).

From the above he got—

Wheat -	984 lbs.
Gojai -	1,230 "
Bejhra -	2,624 "
Rapeseed -	164 "

The bejhra sold for 7l. 2s. in June, and with the proceeds of that and his old oxen (6l.) he paid his half-yearly instalment of rent (2l. 6s.) and bought a new pair of bullocks. In July he sold the quarter of his wheat for 3l., and the rest he kept for the family. His arrangements for the current year are as follows:—

Kharif—		Acre.
Cotton -	-	1
Joár -	-	3
" (closely sown for fodder) -	-	7/8
Rice -	-	7/8 succeeded by bejhra.
Rabi—		Acre.
Wheat -	-	1½
Gojai -	-	1½
Bejhra -	-	4½

The kharif seed he had at home. At a favourable day in Asarh (July) he sowed half an acre of cotton out in the outlands after just one ploughing, and ran over the clod-crusher. In the other half acre which he ploughed twice he had to sow three times. The first sowing did not germinate for want of moisture, the second from excessive rain, so that he had to buy Rs. 11 cotton seed in addition to what he had stored. The cotton was weeded three times; til (Sesamum orientale) was sown here and there; patsan (Hibiscus cannabinus) was sown round the edge and furrows of

arhar (Cytisus cajan) sown, running east and west about 10 feet apart, so that the sunlight should reach the ripening cotton. Some urd was also sown afterwards when fear of its choking the growing cotton was over, and a row of joár, also sown inside the patsan, round the edge. He sowed 10 lbs. rice, which was weeded three times. Of joár he used 4 lbs. per acre for seed, mixed with 1½ lbs. of arhar, 1 lb. of urd, and 5 oz. of til. Produce of the above was as follows:—

92 lbs. uncleaned cotton (instead of his usual crop of 122 lbs.) but to this should be added the 1/4th share paid to the pickers. This gave him 30 lbs. cleaned cotton, worth 10s. 6d.; 60 lbs. cotton seed, worth 2s.; 60 lbs. til, worth 7s. The hemp, urd, and arhar failed. As he had to pay 12s. for rent, 1s. 3d. for seed, and 5s. 2½d. for weeding, there was very little profit from the cotton.

1,968 lbs. joár also after deducting the 1/4th share given to those who cut off the heads, and 40 lbs. til, the whole value 4l. 12s., from which he paid 24s. rent, 4s. 8d. for weeding, and 3s. for seed, leaving him 3l. profit.

1,230 lbs. rice, value 2l. 10s., which gave him a profit of 2l. after paying for weeding and seed, as the rent would be paid from the rabi harvest.

Prágdatt does not plough himself, but keeps two ploughers at 4s. a month and ½ lb. parched gram daily.

Account of One Day's Operation.—Incidents of one day at Prágdatt's were as follows:—

About 8.30 a.m. Prágdatt brought his bucket; Badla Chamar, one of his men, brought the yoke and rope; Pusua, the other labourer, drove the cattle, which he yoked and rigged up the pulley and bucket. Badla stood ready to empty the bucket, whilst Pusua drove and Prágdatt went to the field to distribute the water.

As usual the local deities were worshipped with the contents of the first bucket. After a while Prág came and said he had a pain in his hand and sent Pusua to the field, and Badla to drive, whilst he emptied the buckets. Prág had brought with him 1 lb. of joár grain, which about 9 a.m. he divided between his two labourers. Soon after Pusua's child, a lad of about 9 years came up, and Prág got him to help to distribute the water, with the promise of some buttermilk, whilst Pusua went and cut a load of fodder and took it home to Pusua's, after which he came back. About noon an old man sent by Prág's mother came from the village and took the bucket, whilst Prág went home to bathe and eat. His dinner consisted of eight cakes, some pulse, and boiled rice. They sprinkled the bullock-run twice during the day, and a load of the straw was thrown at the bottom of the run for the bullocks to munch as they turned. About 3 p.m. Prág again took the bucket, and Badla went and cut a bundle of green fodder (sehuán and láhi of the mustard class), the day's allowance for the cattle being two bundles of millet stalks cut up in the morning before going to the well, and a bundle of green food mixed with it in the evening, when the cattle feed. Work was knocked off at 6 p.m.

In the day 302 buckets were lifted, each bucket containing 20½ gallons, and less than 1/4th of an acre was irrigated, (4 biswas 17 biswansis), this being the second watering the field had, and therefore the water going further. In one hour 41 buckets were counted, and the measured area showed a depth of 1½ inch of water given to it.

Example 4.—My last instance is a complete contrast to the foregoing. Kanhaya, potter, is a cultivator of 7½ acres, paying a rent of 4l. 16s. His family consists of himself, his wife, a grown-up daughter, who comes to live with him at the busy times of weeding, &c., a son 9 years old and a grandson 11 years old. Latterly, too, his brother-in-law has come to live with him and help in the field.

Food.—Six pounds of flour are cooked every day; of this day they eat—the men two cakes at noon, and the women and children one each; in the evening they get their full meal, or about four thick cakes per man,

three per woman, and two for the children. Last June they got along by taking the grain from the threshing-floor as it was ready. In July he had to borrow 10s. worth, or 180 lbs., bejhra from the banker, eked out with a little gram ground fine and made into porridge. In August he had to borrow another 10s. worth, and kept on the porridge with Putulaca derasea growing on his manure heap as a vegetable. In September he cut his sawan (millet, Panicum miliaceum) with the same vegetable or nari (a water plant) from the pond. In October and November he ate his rice, and for vegetables hemp, flowers, and twigs. As his joár ripened he began to pluck and eat it, but had to borrow 358 lbs. joár from the banker, and will have to borrow till his spring harvest is cut, out of which he will try and satisfy banker and landlord. In 1877 he had enough grain in his house to tide him over the drought up till October, and fodder for his cattle, but had to borrow 4l. 10s. for food and to sink well. So that he owes altogether 4l. 10s. from last year, and has borrowed 1l. 12s. worth of food, 1l. 12s. worth of seed grain, and 6s. for clothes, or in all about 8l.

Clothes.—Every year Kanhaya has to buy himself a pair of waist-cloths (dhotis) worth 2s. 3d., and a pagri worth 6d.; and for his wife a petticoat (1s. 9d.) and shawl 9d. Every other year he indulges in a jacket worth 9d.; and at longer intervals a thick wrap and a quilt. At present is making shift with a patch-work quilt of old clothes.

Jewellery.—He has no silver jewellery in his house, and only 1s. worth of pewter ornaments.

Utensils.—A brass platter worth 1s. 9d., a brass cup, 1s. 6d., a wooden bowl worth 7½d., and three wooden saucers worth 10½d., a stone jar worth 1½d., and some score earthen pots which he gets for nothing from his relations who carry on the occupation of potter, his three cots, a pair of millstones, a sieve, and scoop form the whole of his domestic furniture.

Agricultural Stock.—Kanhaya has a pair of oxen which he bought with borrowed money—one five years ago for 2l. 10s., the other three years ago for 1l. 18s. Has paid off the loan. Lost his cow last year; has a bull calf alive. Has a plough which cost him six years ago 1l. 10s. 10½d., and to which he adds 6d. worth of iron every year in the share, and which he expects to last for another four years. A yoke worth 1s.; a spade, 2s.; two hoes, 4½d.; two sickles, 5d.; a leather bucket costing, all complete, 6s.; which was bought last year, and which he expects to last him over next; a rope, 4s., which lasts him two years; and a pulley; a clod crusher he borrows when required. Last year he had chaff for his cattle till August, when he gave them grass till October; after which he gave them millet stalks, of which he has enough to last him till spring harvest.

Agricultural Operations.—Last year Kanhaya had spring harvest as follows:—

	lbs.	s.	d.
Wheat, 1½ acres produced -	410	value	30 0
Bejhra, 3 " -	1,150	"	39 0
Rape -	165	"	16 0
Safflower seed -	-	"	0 9

From this and the price of ¾ ton chaff (for which he got 10s. 4½d.) he paid his rent for a year.

The arrangements for the current year are:—

Autumn Harvest.		
Joár, 1½ acre produced -	410 lbs.,	sold for 17s.
Cotton, 1½ acre -	130 "	" 16s.
Sawan, ½ acre -	250 "	} kept for house consumption.
Black rice, 1½ acre -	675 "	
Sesamum, " -	40 "	sold for 4s.
Hemp, " -	1 "	made into a rope.

From the above he paid 37s. of his rent, borrowed 4s. more from the bankers, pledging his sisters' neck-lets for 4s. more, but is still 2s. in arrears.

The weeding was done by the family.

Spring Harvest.		
Wheat and gram mixed, 1½ acre.		} Some of this on the land previously cropped with rice and sawan.
Barley and gram mixed, 1½ acre.		
Gram - 2½ acres.		
Safflower, linseed, and rape mixed in the crops.		

CHAP. I. QN. 9.

NORTH-
WESTERN
PROVINCES
AND OUDH.

Mr. Wright.

Cawnpore.

For this he had to borrow 26s. worth of seed from the banker, for which he will pay 25 per cent., i.e., 32s. 6d. worth of grain, whatever the rate at harvest. The seed for the subordinate crops he had at home by him.

His well he dug last year at the end of November, at a cost of 26s. including the wattle supports. This year he had to replace these at a cost of 3s., and even now the well fails when worked hard. Every year Kanhaya gives the barber, blacksmith, and carpenter a couple of pounds of grain each, and a sheaf of corn.

Account of One Day's Operation.—Of one day at the well, Kanhaya came late, not indeed till 11 a.m., and

knocked off work at noon to eat his food; fed his cattle and cut fresh fodder for the evening. About 3 p.m. he began again and left off at 5 p.m. During the day he only lifted 112 buckets and watered less than $\frac{1}{10}$ of an acre, the field being 156 feet. As watering went on, the irrigation beds which had not been made before had to be made.

This shows in what a slovenly and lazy manner some cultivators work, and that it is very unsafe to generalise from particular instances, or to expect too high an average standard of agriculture. On the other hand, the instances of Pattu and Prágdatt prove what a careful cultivator can achieve.

The population of the village is divided into 87 families, of which 50 families cultivate land for their own profit, and 19 families work on the fields, &c., as labourers. The agricultural families possess 87 male adults, and the 19 labouring families contain only 17 men.

The houses of the village are all built of mud. Of a well-to-do family the house usually consists of a little sitting room outside, with three or four rooms inside for the females. The outside room is fairly neat, but the inside ones are little better than miserable hovels, from which light and fresh air are almost excluded.

The following number of families has the following number of the so-called rooms:—

Number of Families.	Number of Rooms.	Number of Families.	Number of Rooms.
1 have	13	4 have	6
1 " "	12	4 " "	5
2 " "	10	15 " "	4
2 " "	9	14 " "	3
1 " "	8	23 " "	2
1 " "	7	19 " "	1

All the houses are either roofed with mud or thatched with straw.

The 50 agricultural families hold 188 acres of land belonging to the village itself, and 78 acres of land belonging to neighbouring villages, total 266 acres; the average holding of each family being 5.26 acres, i.e., for each soul a little less than one acre. The size of the holdings may be further classified as follows:—

Families holding between	1 and 1½ acres	1½ acres	16
" " "	2½	" 5	" 15
" " "	5	" 7½	" 8
" " "	7½	" 10	" 6
" " "	10	" 12½	" 1
" " "	12½	" 15	" 2
" " "	15	" 17½	" 1
" " "		35	" 1
			50

For the 266 acres of land the cultivators pay a rent of Rs. 2,578, or Rs. 9.8 per acre. For the 188 acres of the village land they pay Rs. 2,234, or Rs. 12 per acre. The rents are high on account of proximity to Cawnpore, and much exceed the average rates of the district.

Of the 266 acres of land in the possession of the villagers, 220 acres were under crops during the rabi (spring) and kharif (autumn) crop of 1878.

The greater part of the proceeds realised from the sale of agricultural produce after paying rent goes to the money-lender. It has been ascertained that at the commencement of the rabi (spring) season the 50 cultivating families had a debt of about Rs. 4,000, and that at the end of the kharif (autumn) season the amount increased to Rs. 6,700, notwithstanding grain worth Rs. 877 and Rs. 1,402 in cash, total Rs. 1,479, were paid in liquidation during the year.

The daily expense of food for the 269 souls included in the 50 cultivating families is estimated at Rs. 15, or about 1½d. each person per day. The yearly expendi-

Daily Life and Circumstances of Three Cultivators in village Binayakpur of the Cawnpore District.

Binayakpur lies about five miles from Cawnpore on the grand trunk road to Farukhabad, and was the first village in the North-Western Provinces visited by the Famine Commissioners. Three cultivators of Binayakpur have been selected for an account of their daily life at the request of Mr. Caird. Notwithstanding its proximity to the town of Cawnpore, the village is purely agricultural, and the account of the daily life of a cultivator of this village may be taken as an example of the daily life of the general mass of cultivators. Before describing the three individual cultivators I have selected, I give here a preliminary account of the village as a whole.

The total area of the village is 585 acres, of which 380 acres are recorded as either cultivated or cultivable, and 205 acres uncultivable.

Three kinds of soil are generally found in the village: matiar or clay, domat or loam, and bhur or sandy loam. The areas under each are respectively as follows:—matiar 7 acres, domat 138 acres, bhur 165 acres, the remainder being unascertained. The soil is on the whole of an average character, neither very good nor very bad.

Irrigation is chiefly obtained from the Ganges canal, a branch of which passes near the village. 78 acres of land are irrigated by flowing, and 216 acres by lifted water, technically termed "flow" and "lift." There is only one well in the village used for irrigating purposes, which waters only two acres of land. The remaining 84 acres are unirrigated.

The total population of the village numbers 414, of whom 212, or 51.21, are males, and 202, or 49.79, are females. Of the males 136 are adults, and 76 under 12 years of age. Of the females 134 are adults, and 68 under 12 years.

Hindus form the entire population of the village, and are divided into the following castes:—Brahman, 5; Thákur, 64; Káyath, 19; Káchí, 140; Ahír, 56; Bairagi, 4; Gosháin, 12; Jogi, 25; Bania, 13; Lodha, 1; Kahár, 4; Náí or barber, 11; Teli or oil-presser, 6; and Chamár, 54. It will be thus seen that the village is chiefly peopled by Thákurs, Káchis, Ahirs, and Chamárs, who form respectively 15, 34, 14, and 13, or 76 per cent. of the total population. Almost all cultivate. Thákurs are of the Rájput clan, and probably are descendants of old proprietors. They are not good cultivators. Ahirs are by caste cowherds, but are very good agriculturists. Káchis are the best market gardeners of the Province, and their presence in the village in large numbers gives it an exceptional character. Chamárs are low-caste agricultural labourers who have generally at least a little land of their own. Divided into occupations, the population may be shown as follows:—cultivators, 269; agricultural labourers, 61; mendicants, 31; menial servants, 18; shopkeepers, 13; barbers, 11; oilmen, 6; milkmen, 3; priest, 1; Government servant, 1. These figures include females and children. The cultivators proper, therefore, comprise 65 per cent. of the total population, and if labourers who are chiefly agricultural be included, the proportion living on land comes to 80 per cent. of the total population.

ture of the 50 agricultural families exclusive of rent is stated to be as follows:—

Agricultural.	Other, exclusive of any repayment of debts or interest.
Rent - - - - - Rs. 2,578	Value of food bought or taken from field - 5,028
Price of seed - - - 784	Miscellaneous - - - 592 (rather high)
Manure - - - - - 24	Cloth - - - - - 562
Hired labour - - - 950	Festivals - - - - 266
Repair of implements - 84	Total - - - - - 6,448
Purchase of ditto - - 42	Grand total - - - 11,020
Ditto of cattle - - - 110	
Total - - - - - 4,572	

The lands of the village are held under the following kinds of tenures:—

	Acres.
Sir or zamindar's own land - - -	30
Maurusi, or with occupancy rights - -	228
Ghair-maurusi, or tenancy-at-will - -	68
Muáfi and malikana, or rent-free - -	5
	321

The rest of the area has not been accounted for. During the last settlement the total annual value of the lands (rent-roll) was estimated at Rs. 3,500 at full rates, and the Government revenue fixed on this is Rs. 1,750. Including cesses, the demand on the proprietors is Rs. 2,006, or 57 per cent. of the annual estimated collections.

The village is divided into six parts, and possessed by 57 proprietors, all of whom live in villages within two miles and have other landed property. I give in the following statement some figures regarding the holding and income of each proprietor:—

STATEMENT showing the Circumstances of the PROPRIETORS of Village Bináyakpur.

Name of Proprietor.	Profit from Bináyakpur.	Profit from other Villages.	Total Cash Income.	Proprietary Land in Village Bináyakpur.	Proprietary Land in other Villages.	Rented Land.	Total Land held.	Land Cultivated by Himself.
	Rs. a. p.	Rs. a. p.	Rs. a. p.	Big. bis.	Big. bis.	Big. bis.	Big. bis.	Big. bis.
Pakhar - - - - -	9 5 3	15 12 0	25 1 3	0 13	2 10	2 0	5 3	3 3
Jodha - - - - -	9 5 3	15 12 0	25 1 3	0 13	2 10	2 0	5 3	3 3
Gruid - - - - -	9 5 3	15 12 0	25 1 3	0 13	2 10	2 0	5 3	3 3
Mewa - - - - -	9 5 3	15 12 0	25 1 3	0 13	2 10	2 0	5 3	3 3
Sheo Narain - - -	37 5 0	63 0 0	100 5 0	2 12	2 10	—	12 12	—
Thán - - - - -	14 15 0	23 10 0	38 9 0	1 9	7 18½	3 2	12 9½	12 7
Rám Goshain - - -	7 7 0	11 13 0	19 4 0	0 12½	1 13½	0 10½	2 16½	2 16½
Thakuria Kuwári -	7 7 0	11 13 0	19 4 0	0 12½	1 13½	0 10½	2 16½	2 16½
Chandan - - - - -	3 11 6	5 14 6	9 10 0	0 1	0 17	0 8½	1 6½	—
Angat - - - - -	3 11 6	5 14 6	9 10 0	0 1	0 17	0 8½	1 6½	—
Hanuman - - - - -	3 11 6	5 14 6	9 10 0	0 1	0 17	0 8½	1 6½	—
Shyamal - - - - -	3 11 6	5 14 6	9 10 0	0 1	0 17	0 8½	1 6½	—
Durga - - - - -	14 15 0	23 10 0	38 9 0	0 19	3 15½	3 1	7 15½	7 15½
Gulab Kuwári - -	14 15 0	23 10 0	38 9 0	1 9	4 5	—	5 14	—
Malla - - - - -	37 4 6	63 0 0	100 4 6	2 4½	10 17	7 10	20 11½	17 11½
Chandi - - - - -	37 4 6	63 0 0	100 4 6	2 4½	10 17	7 10	20 11½	17 11½
Daria - - - - -	74 9 0	—	74 9 0	4 18	—	5 8	10 6	—
Dipa - - - - -	41 4 0	750 5 0	791 9 0	—	—	3 0	3 0	3 0
Sadhan - - - - -	20 10 0	350 0 0	370 10 0	3 19½	7 0	9 0	19 19½	12 0
Indar - - - - -	6 14 0	116 10 8	123 8 8	1 6½	2 6½	3 0	6 13½	4 0
Raghuinandan - -	6 14 0	116 10 8	123 8 8	1 6½	2 6½	3 0	6 13½	4 0
Gajádhar - - - -	6 14 0	116 10 8	123 8 8	1 6½	2 6½	3 0	6 13½	4 0
Raghubar - - - -	10 5 0	144 0 0	154 5 0	3 14	—	—	3 14	3 14
Kishan Kuwári -	10 5 0	144 0 0	154 5 0	3 14	—	—	3 14	3 14
Nand - - - - -	5 2 6	72 0 0	77 2 6	—	1 5	20 0	21 5	20 0
Jewan - - - - -	5 2 6	72 0 0	77 2 6	—	2 6	10 0	12 6	—
Kawala - - - - -	5 2 6	72 0 0	77 2 6	—	2 6	10 0	12 6	10 0
Shiu Rám - - - -	5 2 6	72 0 0	77 2 6	—	1 6	10 0	11 6	10 0
Bahes Kuwári - -	10 5 0	80 0 0	90 5 0	1 8	4 8	3 17	9 13	—
Jham - - - - -	10 5 0	144 0 0	154 5 0	—	3 8	—	3 8	—
Shiudin - - - - -	5 2 6	26 0 0	31 2 6	—	2 14	—	2 14	—
Basant - - - - -	0 13 9	33 5 4	34 3 1	—	0 8½	—	0 8½	0 8½
Sundar - - - - -	0 13 9	33 5 4	34 3 1	—	0 8½	—	0 8½	0 8½
Angat (No. 2) - -	1 11 6	66 10 8	68 6 2	—	0 16½	—	0 16½	0 16½
Mukund - - - - -	1 11 6	66 10 8	68 6 2	—	0 16½	—	0 16½	0 16½
Himmat - - - - -	10 5 0	600 0 0	610 5 0	—	4 5	—	4 5	—
Gandharb - - - -	16 15 0	97 10 0	114 9 0	1 8½	18 5	3 1½	22 14½	4 11½
Bhim - - - - -	16 15 0	97 10 0	114 9 0	1 8½	18 5	3 1½	22 14½	4 11½
Ugar - - - - -	16 15 0	97 10 0	114 9 0	1 8½	18 5	3 1½	22 14½	4 11½
Rup - - - - -	16 15 0	97 10 0	114 9 0	1 8½	18 5	3 1½	22 14½	4 11½
Dulan - - - - -	22 9 4	130 2 8	152 12 0	1 17	24 6½	14 15	40 18½	2 13½
Pahap - - - - -	22 9 4	130 2 8	152 12 0	1 17	24 6½	14 15	40 18½	2 13½
Sundar - - - - -	11 4 8	165 1 4	176 6 0	0 18½	12 3½	7 7½	20 9	1 6½
Bhup - - - - -	11 4 8	165 1 4	176 6 0	0 18½	12 3½	7 7½	20 9	1 6½
Manohar - - - - -	67 12 0	390 8 0	458 4 0	6 6	73 0	1 0	80 6	12 5
Chain - - - - -	67 12 0	390 8 0	458 4 0	5 10	73 0	4 5	82 15	14 10
Janak - - - - -	20 13 4	166 10 8	187 8 0	—	5 6½	—	5 6½	4 0
Reoti - - - - -	20 13 4	166 10 8	187 8 0	—	5 6½	—	5 6½	4 0
Tirbhu - - - - -	20 13 4	166 10 8	187 8 0	—	5 6½	—	5 6½	4 0
Harchand - - - -	62 8 9	500 0 0	562 8 0	—	16 0	—	16 0	12 0
Mohan - - - - -	62 8 9	500 0 0	562 8 0	—	16 0	—	16 0	12 0
Goláb Kuwári - -	78 2 0	500 0 0	578 2 0	—	20 10	9 10	30 0	17 0
Hemá Chal - - -	49 12 0	—	49 12 0	—	—	—	—	—
Fateh - - - - -	49 12 0	—	49 12 0	—	—	—	—	—
Sheo Baksh - - -	49 12 0	—	49 12 0	—	—	—	—	—
Mahipál - - - - -	136 0 9	260 0 0	396 0 9	—	27 4	0 10	27 14	20 14
Seo Ratan - - - -	21 7 0	—	21 7 0	—	—	—	—	—
Total - - - - -	1,306 9 9	7,309 7 0	8,616 3 9	59 12	490 8½	183 17	733 17½	255 1

NOTE.—A bigha is equal to nearly half an acre.

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NORTH-
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Example 1. Head of a Well-to-do Family.—Mihrbán Singh, caste Thákur, of the Chandel tribe, by occupation a cultivator. His family consists of himself, age 50; his eldest son, Dhákan Singh, age 24 years; his second son, Gajádhar, age 16 years; his wife, Mithána, age 40 years; Dhákan's wife, Ganga Kumári, age 20 years; and Rukman Kumári, wife of Gajádhar, age 13 years; total, six members.

Holding.—His holding is 10 acres, for which he pays rent Rs. 7.12.5. He holds three acres, with occupancy rights, the rent of which is Rs. 19 2 5, paid to zamindars, Himachal Singh, Pakhar Singh, and Janak Singh, of Kakadeo, two acres as a sub-tenant from Mehrai Gararia, at a rent of Rs. 16, and five acres at Lakhanpur, a neighbouring village, for which he pays Rs. 36 rent. All the land is irrigated from the canal, for which advantage he has paid Rs. 10 to the canal authorities in the current year.

He has at present no bullocks, as he has lately made them over to his money-lender in liquidation of debt.

Agricultural Operations.—In the rabi (spring) of 1878 he sowed the following crops: wheat, sarson, and lahi (mustard species) together on two acres. He sowed wheat and sarson broadcast at the rate of 100 lbs. per acre of the former and 1 lb. of the latter. Lahi was sown in rows, 1 lb. being sown on each acre in three rows. He states that the produce was 400 lbs. of wheat, 320 lbs. of wheat straw, 320 lbs. of sarson (mustard), and 8 lbs. of lahi (mustard species).

Barley was sown on three acres, and the outturn is stated to have been 2,000 lbs. of grain and 1,200 lbs. of straw; the remaining five acres were not sown with any crop. He represents the value of all this produce, excluding the straw, to have been Rs. 84; but he gave all the produce in grain to the money-lender. With the straw he fed his bullocks. On the fields prepared for the spring crops he put seven carts, or about 105 cwts. of manure, which consisted of house-sweepings and cowdung.

In the rains of 1878 he sowed the following crops: joár (Holcus sorghum, a millet), 1½ acres, mixed with a small quantity of mung (Phaseolus mung, a pulse) as an undergrowth; produce: joár, 640 lbs.; mung, nothing; maize, half an acre, with phút (Cucumis momordica) under it; produce: maize, 80 lbs., and phút, 160 lbs. Sesamum, one quarter of an acre; produce, 20 lbs. of seed. Indigo, one acre; produce, 480 lbs. of seed. The value of all this was Rs. 67, but it all went to the money-lender except Rs. 4, which was paid for labour he hired. Besides the produce given above he now and then took small quantities of joár or a few cobs of Indian corn, &c. for his current expenses; he put 45 carts of manure into the kharif (rain crop) fields.

Debts.—Before the scarcity of 1877 his debts amounted to Rs. 150. During the scarcity he borrowed Rs. 125 worth of grain: wheat, 1,280 lbs., Rs. 50; bejhra (barley and peas mixed), 1,000 lbs., Rs. 50; and straw for cattle, 14,400 lbs., Rs. 25. In 1878 he took Rs. 375 for paying rent, for food expenses, and for the marriage of his second son Gajádhar. His total debts, therefore, amounted to Rs. 650 in 1878, out of which he paid spring crops to the value of Rs. 84 and Rs. 63 worth of rain crops. He pays interest at the rate of Rs. 2 per cent. per month.

Clothing.—He has the following wearing apparel in his house:—

Of Mihrbán Singh himself:

One dhoti (waist cloth) of English cloth, five yards, price Re. 1; one dhoti of country cloth, called garha, 12 annas; one mirzai (shirt) of English cloth, eight annas; one dopatta (sheet) of English fine cloth, 12 annas; one angochha (napkin), two annas; one matress, Re. 1; one razai (quilt), Re. 2. Total, Rs. 6 2 0.

Dhakan Singh, eldest son, has the following clothes:—

	Rs.	a.	p.
2 waist cloths of English stuff	-	1	8 0
1 shirt of ditto	-	0	8 0

	Rs.	a.	p.
1 sheet of country cloth	-	0	8 0
1 napkin	-	0	2 0
1 mattress	-	1	0 0
1 quilt	-	2	0 0
Total	-	5	10 0

Gajádhar, second son, lives in his grandmother's (mother's mother) house, some 20 miles away.

Mithána, wife of Mihrbán Singh, has the following:—

	Rs.	a.	p.
2 lehngas (petticoat)	-	2	0 0
1 shawl	-	1	0 0
2 small shawls	-	0	9 0
2 sinábandh (breast-band)	-	0	4 0
Total	-	3	13 0

Ganga Kumári, wife of Dhakan, has the following:—

	Rs.	a.	p.
2 petticoats	-	2	2 0
1 shawl	-	1	0 0
2 smaller shawls	-	0	10 0
Total	-	3	12 0

Rukman Kumári, wife of Gajádhar, has the following:—

	Rs.	a.	p.
2 petticoats	-	2	0 0
1 shawl	-	0	12 0
1 small shawl	-	0	5 0
Total	-	3	1 0

Besides above there are four old quilts in the house, which are used in the cold season. Each of the male members of the house have also one quilted shirt of English chintz, and the women have each a silken petticoat, price Rs. 2, and one shawl of jamdani (cloth, with flowers of needlework), price Re. 1 8 0, and one larger shawl, price Rs. 2 each, which are worn on holidays and festivals.

Jewellery.—In the shape of ornaments Mihrbán's wife has one nose-ring made of gold, price Rs. 2; and anklets made of bell-metal, price Re. 1 8 0. Ganga and Rukman, the two daughters-in-law, have each of them a nose-ring of gold, price Rs. 20; armlet of silver, price Rs. 15 to Rs. 20; and anklets of bell-metal, price Re. 1 8 0.

Utensils and Furniture.—The cooking utensils and eating plates in the house are as follows:—

	Rs.	a.	p.
2 lotas (brass jugs)	-	2	0 0
2 thalis (brass plates)	-	2	0 0
1 batua (brass pot)	-	2	0 0
1 ditto, smaller	-	1	0 0
1 glass of bell-metal	-	0	8 0
1 iron pan	-	2	0 0
1 „ spoon	-	0	2 0
1 „ pan for making cakes	-	0	4 0
1 „ spoon (big)	-	0	6 0
1 „ tongs (chimta)	-	0	1 0
Total	-	10	5 0

Besides above furniture he has two cups of bell-metal, three boxes of wood, two wooden plates, one mat of jute cloth, and eight bedsteads.

Agricultural Implements.—His agricultural implements are the following:—

	Rs.	a.	p.
1 plough, with 4 lbs. of iron	-	0	6 0
1 yoke of wood	-	0	2 0
1 small spade (khurpi)	-	0	1 3
2 sickles	-	0	3 0
1 chopper	-	0	6 0

	Rs.	a.	p.
1 axe	-	0	2 0
1 spade (big)	-	1	0 0
Total	-	2	4 3

All these implements he bought except the wood-work, which he got made by a carpenter.

Dwelling.—His house is of mud, and was built by his father and uncle. It consists of four rooms, three verandahs, and two out-rooms. The house is shared by his three other brothers, who live in it, but eat separately. The value of the house is now estimated at Rs. 200. Its repairs cost the four brothers about Rs. 15 annually.

Orchard.—Mihrbán Singh and his three brothers possess in common two mango garden on 1½ acres of land, containing 30 trees, and two gardens of jujube on half an acre of land, containing 25 trees. The fruits are in some years sold, while on others eaten. Last year they were sold at Rs. 28, of which Mihrbán Singh got his share of Rs. 7.

Food.—The family live on joár (Holcus sorghum) in November and December, on bájra (Penicillaria spicata, a millet) in January and February, and on bejhra (barley and peas mixed together) in other months. The grain is powdered into coarse flour and cakes made of it, which are eaten with a soup made of split peas or pulses, chiefly of arhar (Cytisus cajan) or vegetable, meat, or fish curry. But soup of split peas is the rule. The quantity of food daily consumed by this family of five members is, flour, 10 lbs.; split peas, 1 lb.; salt, 2 ounces. The following extra expenditure is also incurred during the year: oil of mustard, Rs. 12; tobacco, Rs. 9; spices, consisting of turmeric, coriander seed, and red pepper, Rs. 3; betel-leaf, Rs. 9; fish, meat, and vegetables, Rs. 3. Fuel is not bought, but obtained from dried cowdung, now picked up from here and there, as there is no cattle in the house.

Account of One Day's Operations.—On the 1st of May 1879, Mihrbán Singh rose in the morning and went with two hired labourers to the farmyard where bejhra (barley and peas mixed) was being threshed. He worked on it till 10 o'clock, when he returned home and took his meal, which consisted of cakes of about 1 lb. of bejhra flour, ¼ lb. of pulse (arhar) soup, and some unripe mango ground with red pepper and salt. After meal he went with his brother-in-law to the judge's court at Cawnpore, where the latter had some work. There he sat with the revenue agents (mukhtars), when his brother-in-law looked after his work. He came back at 8 o'clock in the night and took his evening meal, consisting of the same as in the day, and went to sleep outside the house.

Dhakan Singh rose early in the morning and went to hire two labourers, whom he brought and made over to his father, who took them to the farmyard. He remained at home doing nothing, when his father came back, and he went to the farmyard and worked with the labourers in threshing the bejhra (barley and peas). At 12 o'clock he returned home, took his food of 1 lb. of bejhra flour cake, ¼ lb. of arhar, and some mango. He then took rest for some time, and then again went to the farmyard with the labourers. At nightfall he returned home and sat outside his house, smoking and chatting till 9 o'clock, when he took his evening meal, consisting of the same food as in the day, and went to sleep on the roof of the house.

Mithána, Mihrbán Singh's wife, rose early in the morning, washed, and employed herself in cleaning the cooking utensils and the cooking-place, with the assistance of Ganga, her elder daughter-in-law. Then she raised water from the well which is inside the house, and after doing this she made cakes of cowdung collected from the farmyard, and spread them in the sun to dry for fuel. She then assisted Ganga in cooking the meal of the family for the day. At 10 o'clock her husband returned from the farmyard, to whom she gave food. At 12 o'clock her son came,

and after feeding him, she and her daughters-in-law took their meal and went to take rest for two hours. Her food consisted of cakes made of a little less than 1 lb. of bejhra (barley and peas mixed), flour, and the usual soup of arhar pulse. At 2 she swept the house, washed the utensils, cleaned the bejhra grain for next day's food, and gave it to a (woman) neighbour for being ground into flour. In all this Ganga assisted her. In the evening she and Ganga cooked the food for the night. At 9 o'clock, after feeding the male members, the women took their food. Mithána then went to sleep on the roof of the house.

Ganga Kumári, wife of Dhákan Singh, rose in the morning, washed, and then ground 10 lbs. of bejhra for the food of the family on that day. She then assisted her mother-in-law in cleaning the house and making preparations for cooking the food. She herself cooked the food, assisted by her mother-in-law. After the siesta in the noon she assisted her mother-in-law in cleaning the grain for the next day, and at the same time chatted with a neighbour, a Káchi woman, who came to pay her a visit. In the evening she again cooked the food, assisted by her mother-in-law, and, after taking her meal in the night, went to sleep with her husband on the roof of the house at 10 o'clock. She does not always grind the flour, but it is now and then given to a woman, to whom half an anna is paid for grinding every 10 lbs. of grain.

Rukman Kumári, the second daughter-in-law of Mihrbán Singh, is young and not allowed to work at present.

Example 2. A Family of Middling Circumstances.—Sewak, called in the village Shiuki, caste Káchi, by profession a cultivator. His family consists of himself, age 55 years; his eldest son, Chiranju, age 27 years; second son, Gumáni, age 22 years; third son, Durján, age 17 years; his wife, Khosála, age 50 years; Chiranju's wife, Rukmini, age 25 years; Makhana, wife of Gumáni, age 20 years; Sukhia, daughter of Sewak, age 9 years; and Raghubara, son of Chiranju, age 6 years.

Holding.—Sewak's holding is as follows:—At Bináyakpur he holds three acres at a fixed tenure, for which he pays Rs. 45 3 3 to Janak Singh, zamindar of Kákádeo; he rents 1½ acre as a sub-tenant from Thakur Bandi Singh, for which he pays Rs. 17. The soil of this 4½ acres is domat (loam), of which 3¼ acres are irrigated from the canal, for which privilege he pays Rs. 7.2.0 to the canal authorities. The remaining one acre, on which he produces vegetables and garden crops, is irrigated from a well. Besides this he holds at Lakhanpur, a neighbouring village, six acres of land as a tenant-at-will, for which he pays Rs. 17 to the manager of the Rawatpur estate. This land is of bad sandy soil and is unirrigated, producing only one crop, that of the rains in the year. He thus cultivates 10½ acres of land, paying Rs. 79.3.3 as rent to zamindars, and Rs. 7.2.0 to canal authorities; total, Rs. 86 5 3.

Plough Cattle.—He purchased a pair of bullocks, six years ago, at Rs. 36. They are eight years old now, and one of them has become almost useless. Besides, he has a pair of goats. The following is his account of the agricultural operations of the year:—

Agricultural Operations.—In the rabi (spring) of 1878, he sowed 1½ acres with wheat mixed with sarson and lahi (mustard species). He first sowed wheat seed broadcast; then sprinkled sarson seed on the field; lastly, he put lahi seed in rows at the rate of six per acre, the breadth of each row being a cubit or so. The produce was wheat, 480 lbs.; straw, 480 lbs.; sarson, 80 lbs.; láhi, 40 lbs. Barley was put on 1½ acres; produce 640 lbs. of grain and 640 lbs. of straw. On half an acre he put peas, the pods of which he sold green at Rs. 2; onion, one acre, produce gradually sold at Rs. 50; carrots, half an acre, produce 1,440 lbs., sold at Rs. 9. The total sum he obtained was Rs. 104.

In the kharif season of 1878 he sowed:—

Joar (Holcus sorghum), one acre, produce 480 lbs. of grain, value Rs. 12; Indian corn, 1½ acres, produce

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880 lbs., value Rs. 22; indigo, $1\frac{1}{2}$ acres, produce 120 lbs. of seed and 240 lbs. of plant, value Rs. 25; vegetables, $1\frac{1}{2}$ acres, produce sold at Rs. 50. With joar he sowed some mung and lobia (pulses), but the out-turn was nil. People in his village usually sow phút (gourd caten raw) with maize, but he did not do it. The total sum he obtained by selling his rain crops was Rs. 109.

He can afford to put very little manure into his field. As he chiefly lives on the proceeds of his vegetable garden, he puts the greater part of the manure he can collect into it. In 1878 he purchased 150 cwts. of manure (10 carts full) from one of the villages, which consisted of cowdung and sweepings. He put this into his vegetable ground. His home manure filled six carts (85 cwts.), which he put into his rain crop fields.

Debts.—The produce of the rain and spring harvests are almost entirely sold, and the proceeds generally given to his money-lender, who at the harvest time watches him. Only when the crop is ripe can he take small quantities of grain for daily use. The fodder from the rain crops he is allowed to give to his cattle.

His money-lender is Gopál, Káchi. Before the scarcity season (1877) he had an old outstanding debt of Rs. 105, which he took for paying rent, for hired labour, for cloth and food expenses, not for any marriage, feast, or festival. In the scarcity year he took Rs. 62 in cash. He pays interest at the rate of Rs. 2 per cent. per month, or 24 per cent. He does not borrow grain, for in that case he has to pay back with 25 per cent. interest, besides 4 lbs. extra for every 80 lbs. From the proceeds of the spring crops he gave to the money-lender Rs. 69, but did not give anything from the rain crops. He had thus some money left in hand, with which he paid his rent, bought clothes, and met miscellaneous expenses. At the end of the autumn harvest the balance of his principal debt amounted to Rs. 98.

Clothing.—At present the members of his family have the following wearing apparel:—

Himself and other male adults of the family have each one waist-cloth (dhoti), value Re. 1; one napkin (angochha), 4 annas; one shirt (mirzai), 8 annas; one sheet, 8 annas. This is worn all round the year. In the cold season they cover themselves with a quilt (razai) made three years ago at Rs. 2 each. His grandson, Raghubara, has two napkins, purchased at Re. 1, and one shirt at 6 annas. The female adults have each one petticoat, value Re. 1; one sheet at 8 annas; and one shirt (kurta), old, at 4 annas. Sukhia, the daughter, has, besides these, one extra sheet. The daughters-in-law have also holiday clothes, consisting of one petticoat made of check cloth, and one sheet of red cloth called salu, both costing Rs. 4 8. These were given to them when they first came to Sewak's house some 10 years ago. The clothes of the male members are generally of English cloth called markin, the sheets being of country coarse cloth called garha.

Jewellery.—Of ornaments, Sewak's wife has a pair of anklets made of brass, weighing eight ounces, price 6 annas; brass rings for her toes, price 2 annas; and a nose-ring of gold, price Rs. 4. The daughters-in-law have the same, but their nose-rings cost Rs. 5 each. They also wear lac bangles, price 2 annas for about 20, worn at one time on both the hands. They have also made a hole in their ears, in which they wear a cork-like ornament made of palm leaf and lac, a pair of which can be had at a quarter of an anna (about a farthing).

Utensils and Furniture.—The furniture of Sewak's house consists of two brass plates (thali), weighing 4 lbs., price Rs. 2; two cups of bell-metal, 2 lbs., Rs. 2; two brass jugs (lota), 3 lbs., Re. 1 8; one brass cooking pot (batloi), 3 lbs., Re. 1 8; one iron pan for making cakes, 2 annas; one iron spoon, 1 anna; two husking mortars made of wood, $4\frac{1}{2}$ annas; and three old bedsteads (khatoli), price when new about Re. 1 8.

Agricultural Implements.—His agricultural implements are—one plough, Re. 1; one yoke, 4 annas; five khurpas (small spade), 10 annas; five sickles, 9 annas; one chopper, 8 annas; one old pur (apparatus made of leather for raising water from a well), Rs. 5; and one rope, Re. 1—total, Rs. 8 15.

Dwelling.—His house is of mud, gradually built and repaired during the last 30 years. It consists of three rooms inside and a small room outside. The materials cost him about Rs. 30, and he paid very little for labour. He spends about Rs. 3 every year for repairs.

Food.—The food of his family consists of joar (a millet) in November and December, bájra (another species of millet) in January and February, and bejhra (barley and peas mixed) in other months. Wheat is eaten only at feasts and festivals. The quantity of food daily consumed in his family is flour 16 lbs., split peas 3 lbs., salt 2 ozs., powdered grain (satu) or parched gram (chabena) as lunch 2 lbs. Vegetables, fish, or meat are seldom bought, but the first is obtained from his own garden, and now and then substituted for the soup of split peas. The family takes two meals during the 24 hours—once at 12 o'clock in the day, and again at 8 or 9 in the night. The workers take a breakfast of satu or chabena, besides, at 10 o'clock in the day. The miscellaneous expenditure consists of oil Rs. 12 in a year, tobacco Rs. 5, spices (turmeric, red pepper, and coriander seed) Rs. 3, and Rs. 3 paid in kind for barber and washerman. Sewak does not purchase fuel, neither does he ever pay anything for doctor or medicine.

Account of One Day's Operations.—Sewak is an old man, and he does not do heavy work. On the 1st of May last he rose in the morning and sat outside his house till 10 o'clock, when he washed himself and went to the farmyard, where the spring crops are being threshed. He looked in to one thing and another till 12, when he took his food, which consisted of cakes made of about 2 lbs. of bejhra (barley and peas), flour, soup of $\frac{1}{4}$ lb. of split peas, and some green mango ground with red pepper and salt. Then he took a nap till 3, when he came outside his house and played and chatted with his grandson Raghubara. He did no work in the evening, but sat quiet or smoked or chatted till 9, when he took his night meal, which was as in the day, but in a little less quantity. He slept in the night at the farmyard.

Chiranju, the eldest son, and brothers rose early, smoked tobacco, and went to irrigate the yam and onion field by lifting canal water with his brothers Durján and Gumáni and a hired labourer. At 10 the three brothers came home, took each $\frac{3}{4}$ lb. of satu, or powder made of parched barley and peas, and then again went to their work. At 12 they again came home and ate their noon meal, which consisted of the same as eaten by Sewak. They then took rest for two hours, and then again commenced to irrigate the land, which they did till nightfall. During their work nobody came to them, except a stranger who was passing by the road. He sat for some time where they were working, and went away, remarking that the place where they stand to lift water is well shaded. At evening they came home and sat outside the house, smoking and chatting till 8 o'clock, when they took their evening meal, which was of the same things as in the day. Chiranju slept outside the house, and Durján and Gumáni at the farmyard with their father.

Khosála, wife of Sewak, rose after the sun was up, brought out the two goats from the fold and cleaned their place, and then gave them some mustard leaves which were in the house. She then fed Raghubara with some cakes saved from last day's food, adding a little salt. At 8 she went to the vegetable field to assist her sons in regulating the flow of the water thrown into it by the men. At 10 she returned home and began to sew a quilt. After the men had taken their food at 12, she ate cakes of about $1\frac{1}{4}$ lb. of bejhra flour with soup of split peas, and took rest till 2 o'clock; she then again employed herself in sewing the quilt.

during which time a neighbour (woman) came, with whom she talked of household affairs. In the evening she talked with the children who came back from the field. At 8 in the night she took her evening meal, consisting of the same as in the day, but in less quantity. She slept inside the house, taking with her her grandchild Raghubara.

Rukmini, wife of Chiranju, rose early in the morning, and with Makhána, the wife of Gumáni, ground 16 lbs. of bejhra for the food of the family during the day. Rukmini then cleaned the place where cattle are kept, made the dung into cakes, and spread them in the sun to dry for fuel. Makhána cleansed the utensils. At 10 Rukmini cooked the food with the assistance of Makhána. Sukhia went with water and tobacco to her brothers in the field. At 12, after feeding the male members, Rukmini and Makhána took their food of 1 lb. of flour cake with soup of split peas. They took rest for two hours, and then rose and cleaned the grain for next day's food; after which they fetched water and cleaned the utensils and the cooking-place. In the evening Rukmini again cooked the food, assisted by Makhána. At 8 they took their evening meal and went to sleep inside the house. Sukhia and Raghubara do not work but go to the field with lunch water, and tobacco, for the workers.

Example 3. A Family of Poor Circumstances.—Lálua, caste Káchi, by occupation a cultivator and a labourer. His family consists of himself, age 28 years, and his wife, age 15 years.

Holding.—He holds 3 acres on a fixed tenure from the zamindar and $\frac{1}{2}$ acre as a sub-tenant from Iswari, Káchi, of Bináyakpur. The soil of his land is loam $1\frac{1}{2}$, and sandy loam 2 acres. He pays rent Rs. 17 8.0 for the land he holds direct from the zamindar, which he irrigates from the canal, and pays Rs. 5 more for water-rate. For the land which he sub-rents he pays Rs. 4; in this he grows vegetables. He has no bullocks of his own, but gets them on hire when he wants their services.

Agricultural Operations.—In the spring season of 1878 he sowed $1\frac{1}{2}$ acres with wheat, sarson, and lahi (mustard species). He put 120 lbs. of wheat seed in the $1\frac{1}{2}$ acres, $1\frac{1}{2}$ lbs. of sarson seed, and $1\frac{1}{2}$ lbs. of lahi seed, the last sown in rows as usual. The produce was wheat, 400 lbs., value Rs. 15; straw, 240 lbs., Re. 1 8 0; sarson, 160 lbs., Rs. 8; lahi, 80 lbs., Rs. 3; barley sown alone on $\frac{1}{2}$ acre, produce 320 lbs., Rs. 8; peas on $\frac{1}{2}$ acre, produce 80 lbs., Re. 2; straw of barley and peas, 240 lbs., Re. 1. Total spring crops, $2\frac{1}{2}$ acres, value Rs. 38 8.0. He did not sow any spring crops on the remaining $\frac{1}{2}$ acre. He put on his wheat field five carts of manure (75 cwt.), which consisted of cowdung picked up by him in the village and the sweepings of his house.

His rain crops of 1878 were joar $\frac{3}{4}$ acres, produce 320 lbs., value—grain, Rs. 8; fodder, Rs. 5. With this he also put some pulses (Phaseolus radiatus and mungo), but obtained no return. Maize, $\frac{1}{2}$ acre, produce 80 lbs., Rs. 2, fodder, Re. 1. He put gourd with it, which he sold at Rs. 2. **Bhindi** (Abelmoschus esculentis), and torai (Luffa pentandra), $\frac{1}{2}$ acre, produce 640 lbs., value Rs. 16. Total value of rain crops, Rs. 34. The remaining $1\frac{1}{2}$ acre he left fallow for spring crops. He put 10 carts of manure into the maize and vegetable field. Before the scarcity season his debts amounted to Rs. 24, which he had borrowed from Shiu Charan, Ahir, of a neighbouring village, for paying rent and food expenses. He took from him again Rs. 20 during the scarcity for food expenses. From the proceeds of the spring crops he paid Rs. 21 8.0 for rent, and Rs. 16 8.0 to Shiu Charan. He also paid him Rs. 16 from the rain crops. During 1878 he borrowed a further sum of Rs. 10 12.0 for paying rain crop rents, and another sum of Rs. 10 from Jadu Nath Singh of Kákádeo for buying clothes

and food. Besides all this, he also took now and then small quantities of grain from Shiu Charan for current expenses. His cash debts now amount to Rs. 32 principal, for which he pays 24 per cent. interest.

Clothing.—He and his wife have the following wearing apparel:—Himself, 2 markin waist cloths, Rs. 2; 1 napkin, 2 annas; 1 shirt, 5 annas; a quilt made three years ago at Rs. 2 12.0. Wife's petticoat, Re. 1; 1 shawl, 8 annas; 1 old shirt, 4 annas. She has a nose-ring of gold, price Rs. 3; anklet of bell-metal, $\frac{3}{4}$ lb., value 8 annas; bell-metal rings for toes, 4 annas.

Utensils and Furniture.—Lálua's household furniture is as follows:—

1 brass plate, 2 lbs., Re. 1; 1 brass jug (lota), $1\frac{1}{2}$ lbs., 10 annas; 1 brass pot (batloi), 4 lbs., Rs. 2. Besides these he has 1 wooden husking mortar, 1 iron spoon, 1 iron pan, and 2 bedsteads, 1 good and 1 broken.

Agricultural Stock.—His agricultural implements are 2 sickles, price 3 annas, and 1 small spade (khurpi), 2 annas. He hires ploughs, &c.

Dwelling.—His house is of mud, built by his grandfather and father. It consists of two rooms inside and one room outside. Its value is estimated at Rs. 20.

Food.—The quantity of food daily consumed in his family is bejhra flour (barley and peas mixed), 3 lbs., arhar (Cajanus indica) peas 1 lb., and a little salt. During the hot season, on certain days, 1 lb. of satu (barley and peas parched and ground), is also eaten. Vegetables obtained from his own field is now and then eaten; fish, meat, or milk very seldom.

He also works as day labourer when there is no work in his own field. He then gets $1\frac{1}{2}$ anna per day with $\frac{1}{4}$ lb. of parched grain, or 2 annas without it. During the year he earns Rs. 8 or 9 in this way, and from it he meets the canal rate, expenses for oil, tobacco, and other miscellaneous items. He himself also, on the other hand, hires labour and cattle for which he pays about Rs. 3 in a year.

Account of One Day's Operations.—On the 1st of May last he rose early in the morning and commenced to weed his $\frac{1}{2}$ acre of yam. At 10 his wife took to him $\frac{3}{4}$ lb. of parched grain (chabena), which he ate and again went to work. At 12 he came home and ate cakes made of 1 lb. of (bejhra) flour and $\frac{1}{4}$ lb. of split peas, after which he smoked twice and took rest for two hours. At 2 he rose again and went to weed the field, in which he remained engaged till nightfall, when he returned home, sat outside his house smoking and chatting with his mother and sister-in-law (brother's wife), who live separate. He then took the same quantity of food as in the day, and at 10 o'clock went to bed.

His wife rose in the morning and ground 3 lbs. of bejhra for the daily food of the family. Then, after fetching water, she cleaned the cooking-place and the utensils. At 10 she took parched grain to her husband in the field, and returning from there, cooked the food for the two meals (day and night). At 12, after feeding her husband, she herself ate food and took rest for 2 hours. At 2 she picked up some cowdung in the village, made it into cakes, which she spread out in the sun to dry for fuel. Then she swept the house and fetched water. In the evening, after feeding her husband, she herself ate food and went to sleep at 10. She cooked on this day 3 lbs. of bejhra flour and 1 lb. of arhar dal. They say that they can eat more, but cannot afford to do it.

NOTE.—In reading the above account it must be remembered that "kachis" or "market gardeners" are above the average of ordinary cultivators both in skill and industry. They are, however, made in consequence to pay higher rates of rent by landlords.

Ordinary economic condition of agricultural population.—Agriculturists divided into three classes.—In order most clearly to set forth the ordinary economic condition of the rural agricultural population, i.e. those directly engaged in the cultivation of land, it will be useful to divide them, proprietors as well as cultivators, into three broad classes.

A. Those who take no personal share in the actual work of agriculture beyond superintendence of servants and hired labourers, and whose women do not appear in public.

B. Those who themselves engage in agriculture, and whose women assist them; extra labour being engaged at times of pressure, and for the cultivation of so much of the holding as may be beyond their own capabilities.

C. Those who depend solely on their own labour, and that of their families, for the cultivation of their lands.

Disposal of produce.—The more valuable crops—wheat, rice, cotton, sugar, barley—are, as a rule, first disposed of to pay the rent, enough being retained for seed by those who are not too deeply in debt. Agriculturists of class A. also retain a sufficiency of the best crops for purposes of entertainment. Those of class B. rarely can do so; class C. never (also see para. 13 *infra*).

Uneatable products.—All the uneatable portions of crop (karbi, straw, bhusa) are sold, save what is required for the food of the cattle of the producer.

Field wages.—Field wages are never paid in the better classes of grain. The cheapest grain of the day is given.

Servants.—Agriculturists of class A. all entertain at least two permanent farm servants, viz., one ploughman and one herdsman; where the holding is large, more than one ploughman is kept, but never more than one herdsman. These men do all the ploughing, sowing, and irrigating; and they also prepare the master's chillam (i.e. pipe), gather up or cowdung fuel, bring in firewood from the jungle, and do all such miscellaneous out-door work.

Agriculturists of class B. usually retain a ploughman and herdsman only so long as their services are actually in request; but when there is no member of the family who can perform the duties of herdsman, a man is retained permanently by this class also for this latter labour.

These farm servants are usually paid in grain; when in cash it is never at a higher rate than Rs. 2 per mensem.

Cash expenditure annually.—Certain agricultural necessities have to be purchased in cash. A set of agricultural implements—hoe (*kudāl*), shovel (*phaura*), ploughshare (*phār*), chaff-chopper (*gan-dāsa*), sickle (*hansia*), grass-scraper or hand hoe (*khurpa*)—costs from Rs. 2–8–0 to Rs. 3 the set. The wooden portions cost nothing, being contributed by the landlord from trees growing in the village. Once purchased, they cost practically nothing in repairs, this being done by the village blacksmith and carpenter, who each get in return a few handfuls of grain per plough at harvest time as a perquisite. About 8 annas per annum should be allowed for renewals.

The skin in which water is raised from the wells (*moth* or *charsa*) costs Rs. 2, and has to be renewed annually.

The rope by which water is raised (*nar* or *lao*) has to be renewed every two years. To agriculturists of class A. this rope costs Rs. 2 (viz., flax Re. 1 and labour Re. 1). To classes B. and C. it costs nothing if they have grown their own flax; if not, it costs them Re. 1 for flax, and they make it themselves.

The above implements have to be procured and kept by all classes of cultivators.

II. On the household.—Clothing.—Weaving is done to a greater or less extent in the household by the women of all three classes of agriculturists, and by the old women always. Of course, the more of this work done in the house, the less the cost of clothing the family. But certain articles of clothing must be purchased for cash annually. The following may be taken as a fair estimate of this expenditure for each class:—

Class A.

For each male—

	Rs.	a.	p.
2 cotton waist-cloths (<i>dhoti</i>) at Re. 1	2	0	0
1 short cotton coats (<i>mirzāi</i>) at as. 8	1	0	0
1 cotton sheet (<i>chādar</i> or <i>galāf</i>), lasts two years and costs Re. 1	1	0	0
1 short padded cotton coat for cold-weather wear at Re. 1	1	0	0
1 pair of shoes	1	0	0
1 padded quilt (<i>razai</i>), lasts two years and costs Re. 3	1	8	0
1 groin cloth (<i>phenta</i> or <i>angochha</i>)	0	8	0
Total annual cost of clothing	8	0	0

For each female—

	Rs.	a.	p.
1 cotton petticoats (<i>sari</i>) at Rs. 2	4	0	0
1 sheet (<i>chadar</i>) at Re. 1	1	0	0
1 padded quilt (<i>razai</i>) for two years at Rs. 3	1	8	0
Total annual cost of clothing	6	8	0

Class B.

For each male—

	Rs.	a.	p.
2 cotton waist-cloths at Re. 1	2	0	0
1 single cotton coat	0	5	0
1 double " for cold weather	0	9	0
1 sheet at Rs. 2 for two years	1	0	0
1 pair of shoes	0	6	0
1 groin cloth	0	6	0
1 blanket for two years at Re. 1	0	8	0
Total annual cost of clothing	5	2	0

For each female—

	Rs.	a.	p.
2 cotton petticoats at Re. 1	2	0	0
1 blanket for two years	0	8	0
Total annual cost of clothing	2	8	0

Class C.

For each male—

	Rs.	a.	p.
2 coarse cotton waist-cloths at annas 12	1	8	0
1 blanket at Re. 1 for two years	0	8	0
1 double cotton coat	0	8	0
Total annual cost of clothing	2	8	0

For each female—

	Rs.	a.	p.
2 coarse petticoats at annas 12	1	8	0
1 blanket for two years	0	8	0
Total annual cost of clothing	2	0	0

Household Implements.—Classes A. and B. use metal dishes—brass for Hindús and copper for Muhammadans. A full set for one person comprises and costs as follows:—

(a.) For Hindús—

	Rs.	a.	p.
1 brass lota or goglet	1	2	0
1 " thālī or plate	1	1	0
1 " abkhora or drinking glass	0	10	0
1 " batua or pipkin	1	12	0
1 iron tawa or baking plate for flat cakes	0	4	0
1 iron karāhi or basin	0	8	0
Total cost	5	5	0

(b.) For Muhammadans—

	Rs.	a.	p.
1 copper lota	1	2	0
1 " katora or drinking cup	0	6	0
1 " rikābi and piyālī or plate and bowl	0	11	0
1 copper patilī or cooking pot	1	6	0
1 iron tawa	0	4	0
1 " karāhi	0	8	0
Total cost	4	5	0

A single article of each of the last four descriptions of vessels of both (a. and b.) suffices for an ordinary family, as also does one *thālī* among Hindús; but where there are more than two grown-up males in residence more than one *thālī* is generally used among the better classes of Hindús. Each grown-up male has a *lota*, and among Musalmans a *katora* also. Renewals of the stock are seldom necessary, but additions are made in favourable years as they can be afforded, this being the commonest form of funding surplus cash.

Agriculturists of class C. possess few brass dishes, using chiefly earthen and wooden vessels.

Dwellings.—None of the purely agricultural classes live in masonry houses.

The houses of classes A. and B. are the same in kind, and differ only in the degree of spaciousness and the number of rooms. The walls are of mud, and the roofs generally of grass or home-made tiles laid on bamboos; sometimes of earth laid flat on a platform of tamarisk or arhar (*cajanus flavus*) stalks, resting on mango, nim (*melia azadirachta*), or mohwa (*bassia latifolia*) timber joists. Separate thatched sheds are erected for cattle and farm servants according to requirements.

Class C. lives in the poorest description of hovel. At best it is a single-roomed thatched mud cabin, with a lean-to at one end for the cattle. In the Trans-Jumna tracts, the walls of the houses of this class

are often made of the rough stones, with which a large portion of the surface of that tract is covered. Not unfrequently the whole structure is a fragile erection of wattles (without *dáb*), with some thorny branches strewn on or stuck in the ground around it.

Scores of ruined proprietors or their descendants live in houses which were once comfortable, and even pretentious, residences, and which are crumbling about the heads of the occupants for want of means to repair them; and scores of others, having reached a still lower level, inhabiting hovels under the shadow of the ruins of the ancient home of the family, glad to be allowed to till, as mere *ascripti glebæ*, the soil of which they and theirs were the owners not so very long ago.

Cattle.—The average number of cattle owned by cultivators will be seen from the accompanying tabular statement. Agriculturists of the better class also keep cows for breeding purposes and for the supply of milk and ghi or clarified butter.

The ordinary agricultural bullock of this district is of a poor description, and costs from Rs. 6 to Rs. 18 per head.

Grain is seldom expended as cattle food; chaff, *karbi* (the stalks of *holcus sorghum* and *spicatus*) and coarse cotton cake, produced at home, form the usual food. A small quantity of the coarsest description of salt or salt earth is used as cattle medicine.

The better classes of agriculturists seldom or never sell the produce of cows. That of buffaloes is disposed of, a good animal producing Rs. 30 per annum in this way.

Grain Produce.—The surplus grain produce, i.e., after payment of rent, is expended, 1st, on seed; 2ndly, on the household consumption, and for guests and entertainments; 3rdly, on wages of labourers; 4thly, on purchase of necessities; and 5thly, on payment of debt; or, if there be no indebtedness, is lent out at interest, or sold to purchase extra vessels for the household or ornaments for the women.

Indebtedness.—Of 100 agriculturists in this district, I believe 90 to be more or less indebted. Of these perhaps 60 are able to keep their heads above water, save under the pressure of several successive bad seasons; and the remaining 30 are hopelessly involved and utterly at the mercy of their *bania*.

The indebtedness of the 60 who are not hopelessly involved may be put on an average at about 35 per cent. of their net income.

N.B.—The statements sent up with this reply were found to be too incomplete and inaccurate for reproduction or compilation.

2. The income and expenditure, property and debts, &c., as well as the condition of the agriculturists, whom I selected as exemplar cases for my inquiries, are given in the statements which follows this report.

3. From each proprietor, and tenant with rights of occupancy, I have inquired the quantity of land under cultivation and its outturn, with cost of cultivation, rental assets, Government revenue and cesses. Then I calculated the profits from which the following expenditure is incurred:—Maintenance of family, consisting of males and females; articles of food, with cost for each family; clothes, with costs. These costs were regulated agreeably to the condition

* With other expenses as detailed in accompanying statement.

of each family (*vide* para. 8 of this report). The costs has been included in diet expenses. The remaining expenses, viz., charity, repairs of houses, pay of establishment, &c. have been shown under miscellaneous expenditure.

For ascertaining the property of each, I inquired into the following points, i.e., cash, value of ornaments, grains, fodder, and other house furniture. I have also entered the number and description of each man's houses (in the statement), and their value has also been inserted according to their condition.

The debts were then inquired into, with reasons as to why they were incurred.

There are no grazing lands in this district; when the cultivation is over the cattle graze in the fields.

4. In stating the real fact of the outturn of the crops, the proprietors of the land always hesitate and

CHAP. I. QN. 9. try to conceal the truth. They also hesitate to mention their poverty, prosperity, and other household affairs. In making such inquiries they get alarmed, and think that some tax is to be imposed upon them, or the rent of their lands is to be enhanced. Therefore they conceal their respective status, and exaggerate their debts. Besides this, the management of income and expenditure of the different families depends on the ability of their respective heads. Some can make good arrangements and are more economic, while others are proud and extravagant, and spend more than their caste people. They pay no heed to their income. Some family consists of more members than others, hence its expenditure is comparatively more. Some family is more respectable, and to maintain its respect it has to incur heavy expenses. The expenses of lambardars are generally more than those of tenants and co-sharers. Consequently, it does not follow that all families possessing equal quantity of land, or containing equal members, will incur equal expenses. It remains for me now to explain how far I have ascertained the accuracy of the entries made in statements I. and II.

5. It became necessary for me to make inquiries on the following points:—

I.—Outturn of crops, which the landholders try to conceal.

II.—Cost of cultivation, exclusive of the cultivator and of his family.

III.—Expenses for the necessaries of life, i.e., dieting, clothing, and miscellaneous.

IV.—House and other properties.

V.—Debts, with their causes.

6. As regards outturn of crops, there are four kinds of soil in this district, viz., mār, kabar, parwa, and rakar, each being divided into three classes.

The following table will show the outturn of each bigha of the above soil:—

Soil.	Rate per Bigha.		
	1st Class.	2nd Class.	3rd Class.
	Rs. a. p.	Rs. a. p.	Rs. a. p.
Mār - -	8 0 0	6 0 0	4 0 0
Kabar - -	6 0 0	5 0 0	3 0 0
Parwa - -	5 0 0	4 0 0	2 8 0
Rakar - -	3 0 0	2 0 0	1 8 0

The above average outturn per bigha has been found after consideration of the outturn of a prosperous year, —a comparative drought—and also of the outturn given out by the cultivators themselves. It has also been checked with the rentals entered in the settlement papers, and contrasted with the customary rental of the village. The kharif and rabi outturns of each cultivator were inquired into. The average outturn given by me nearly tallies with them.

7. To ascertain the cost of cultivation, I have inquired fully into the following particulars, viz., price of plough and bakkar, price of bullocks, of kharif seeds, and wages for cleaning and weeding the fields for kharif cultivation, as well as the price of seeds for rabi sowings, and wages for reaping the rabi crop. The average of the above cost is shown in the table below:—

Name of Agricultural Implements.	No.	Cost.	No. of Years for which the Implements last.	Average Cost per Year.
		Rs. A. P.		Rs. A. P.
Juā - - -	1	0 8 0	4	0 2 0
Haris - - -	1	0 8 0	2	0 4 0
Akuri - - -	1	0 4 0	1	0 4 0
Dāuri bakhar - - -	2	0 8 0	2	0 4 0
Lor do. - - -	1	0 8 0	3	0 2 8
Mijhauna - - -	1	0 1 0	1	0 1 0
Datua - - -	2	0 2 0	1	0 2 0
Khaulia - - -	1	0 2 0	4	0 0 6
Rāsi - - -	1	0 0 3	1	0 0 3
Panehti - - -	1	0 1 0	1	0 1 0
Chari (with bamboo) - - -	1	0 2 0	2	0 1 0
Phār (of iron) - - -	1	0 4 0	1	0 4 0
Pāns (of iron) - - -	1	1 4 0	2	0 10 0
Kirora (of iron) - - -	2	0 2 0	1	0 2 0
Repairs of ploughs and bakhar - - -	—	—	—	0 1 3
Total - - -	—	—	—	3 0 0

The sowing of mār and kabar lands is more costly. A pair of bullocks, from Rs. 70 to Rs. 100, is required for ploughing. Inferior bullocks cannot plough the mār and kabar soil, but in parwa soil a pair of bullocks, from Rs. 40 to Rs. 60, might answer for ploughing purposes. The tenants with rights of occupancy generally keep bullocks of Rs. 50 a pair, but tenants at will plough their fields with bullocks of Rs. 30. The maximum time for which a bullock can work is 10 years, and the minimum time is six years. If the price of a pair of bullocks be fixed at Rs. 80, and if they work for eight years, the average cost per year would be Rs. 10. Again, if the price of another pair of bullocks be Rs. 60, and it could work for six years, the average cost would still be Rs. 10 per annum. From the above circumstances it can fairly be inferred that the average cost of a pair of bullocks per annum would be Rs. 10. Generally the cultivators borrow money (from money lenders) when purchasing bullocks, and pay interest at the rate of Rs. 2 per centum per mensem, in addition to *dharta* (premium) of one anna in the rupee; so the additional cost for a pair of bullocks may be put down at Rs. 2.8.0 per annum, the total cost being thus Rs. 12.8.0 per annum. Sixty bighas of the parwa soil might be ploughed with one plough, whereas 40 or 50 bighas of the mār and kabar soil might be ploughed with one plough. To ascertain the quantity of seed shown, 50 bighas have been taken as a limit ploughed with one plough. Of this 50 bighas, two fifths, or 20 bighas, are kharif, and three fifths, or 30 bighas, are rabi lands.

The average cost of sowing seed is as follows:—

	Per Plough.	Bighas.	
		Rs.	A. P.
Weeding of cotton at 1 rupee per bigha	5	5	0 0
Cost of cotton seed at 32 seers per rupee, 2½ seers being sown in a bigha	5	0	6 3
Cost of juār seed at 30 seers per rupee, 1 seer being sown in a bigha	10	0	5 4
Mūng, sown with juār, at 16 seers per rupee, 4 chittacks being sown in a bigha	10	0	2 6
Urd, sown with cotton seed, at 16 seers per rupee, 4 chittacks being sown in a bigha	5	0	1 3
Kodon, sán, til, arhar, kakun, and sama, 5 pie per bigha	5	0	2 0
Total Rs. - - -	-	6	1 4

The cultivator and his family themselves reap, thresh, and winnow the kharif grain, and bring them home (from the fields):—

Name of Grain.	Quantity of Seed sown per Bigha.	Rate per Rupee.	Price.	Average per Bigha.	Price of Seed for 30 Bighas.	Cost of Reaping.
	M. S. C.		R. A. P.	R. A. P.	R. A. P.	R. A. P.
Wheat -	0 15 0	20 seers	0 12 0	—	—	—
Gram -	0 15 0	20 "	0 10 0	—	—	—
Alsi -	0 6 0	12 "	0 8 0	—	—	—
Barley -	0 20 0	32 "	0 10 0	—	—	—
Total -	—	—	2 8 0	0 12 0	22 8 0	11 4 0

The average price of rabi seed per bigha is 10 annas, but generally the cultivators borrow the seed on condition of their repaying the same with an addition of 25 per cent., hence the average per bigha is shown at 12 annas. Accordingly the price of seed for 30 bighas is Rs. 22-8-0. The reaping of the rabi outturn cannot be managed by the cultivators themselves; they have to engage labourers. If the labourers are so strong that three men can reap one bigha a day, they each get 2 annas, but if the labourers are not strong, and four men reap a bigha in a whole day, their wage is 1 anna six pie per man. Six women generally reap a bigha in one day, so they earn an anna each. Although the wages are not paid in cash, but in kind, still the price of the sheaves allowed to the labourers seldom exceed 6 annas per bigha. This gives the total cost of reaping 30 bighas, Rs. 11-4-0. The remaining work of stacking the grain in the barn and of threshing and winnowing it, and then of carrying the same to their home, is all performed by the cultivators and their family; and if the latter consists of a few members, a labourer is engaged for a short time for winnowing purposes, the cost of which has been put at an average of 1 rupee per cultivator.

The cost of cultivation, exclusive of the labour done by the cultivators and their families, is shown below:

	RS. A. P.
Average price of plough and bakhar -	3 0 0
Average price of a pair of bullocks -	12 8 0
Average cost of cultivating 30 bighas kharif land -	6 1 4
Average cost of 30 bighas of rabi land -	34 10 8
Total Rs. - - -	56 4 0

Dividing this (Rs. 56-4-0) by 50 bighas, the average cost of cultivation per bigha is Re. 1-2-0, which of course does not include the labour of the cultivator and his family. This calculation has been shown in the statement, as no cultivator could give a clear information of the cost of cultivation exclusive of the labour of the cultivator and his family.

8. Cost of the necessaries of life include the following items:—

(1.) *Diet expenses*, viz., for grain, salt, oil, gúr, and tobacco (for all), and milk and ghí for men of high family. In the year 12 festivals are observed, viz., Kuár, Dassehra, Diwáli, Deothán, Shankrant, Shiuratri, Holi, Sawan, Janam Ashtami, Anant Cháudás, Ashtomi (in the month of Chait), Ashtomi (in the month of Kuár), and Akhti. During these festivities rich food is prepared and distributed even to the servants. This cost is included in diet expenses. Hospitality is also observed. So the diet expenses put

down in the statement is not much if the number of each family and their respectability be taken into account.

(2.) *Clothing*.—Children up to two years are not (regularly) supplied with clothing; up to four years they remain naked; after this age the girls wear ghangaria and pharia. Up to six or seven years the annual cost of clothing children is 12 annas or one rupee. In the cold weather they generally sleep with their mother or other relatives, hence no extra charge is incurred for covering.

When the boy is above four years he puts on an angochha, and, according to the state of the family, he is allowed other clothes. Some boys are allowed waistcoat, cap, and shoes. The cost of clothing of grown up men and women differs according to their status of life. That of the two classes of cultivators (superior and inferior)—men, women, boys, and girls—is shown in the table below:—

SUPERIOR.

Men.

Description of Cloth.	No.	Price.	Average Cost per Year.
		RS. A. P.	RS. A. P.
Pagri - - -	1	2 0 0	0 8 0
Angarkha - - -	2	1 4 0	1 4 0
Bandi - - -	2	0 12 0	0 12 0
Dhoti - - -	2	2 0 0	2 0 0
Pichaura or chadra -	1	0 12 0	0 12 0
Ruída angá - - -	1	2 0 0	1 0 0
„ pajama - - -	1	1 0 0	0 8 0
Liháf (quilt) - - -	1	1 8 0	0 12 0
Gadela - - -	1	1 0 0	0 8 0
Shoes - - -	1 (pair)	1 0 0	1 0 0
Total - - -	—	—	9 0 0

Women.

Description of Cloth.	No.	Price.	Average Cost per Year.
		RS. A. P.	RS. A. P.
Lúgrá - - -	2	1 8 0	1 8 0
Lahangá - - -	2	4 0 0	4 0 0
Dhoti - - -	2	1 8 0	1 8 0
Choli - - -	3	0 12 0	0 12 0
Khor - - -	1	1 0 0	0 8 0
Liháf (quilt) - - -	1	1 12 0	0 9 4
Gadela - - -	1	1 4 0	0 6 8
Churi - - -	—	—	0 6 0
Shoes - - -	1 pair	0 8 0	0 8 0
Tikli, comb, and surmadani, &c. -	—	—	0 6 0
Total - - -	—	—	10 8 0

BOYS.			GIRLS.		
Description of Cloth.	No.	Price.	Description of Cloth.	No.	Price.
		RS. A. P.			RS. A. P.
Angochha - - -	2	0 12 0	Pharia - - -	2	1 0 0
Angá - - -	2	0 12 0	Ghangaria - - -	2	1 0 0
Cap - - -	2	0 2 0	Shoes and churi -	—	0 8 0
Shoes - - -	1 pair	0 6 0			
Total - - -	—	2 0 0	Total - - -	—	2 8 0

CHAP. I. QN. 9.

NORTH-
WESTERN
PROVINCES
AND OUDH.Maulvi Karim
Bakhsh.

Kunch.

INFERIOR.

MEN.

Description of Cloth.	Number.	Price.	Average Cost per Year.
		Rs. a. p.	Rs. a. p.
Angochhá - - - -	1	0 6 0	0 6 0
Dhoti - - - - -	2	1 0 0	1 0 0
Shoes - - - - -	1 pair	1 0 0	1 0 0
Pichhorá - - - -	1	0 8 0	0 8 0
Khor - - - - -	1	1 0 0	0 8 0
Dhoria - - - - -	1	1 0 0	0 8 0
Total - - - - -	—	—	3 14 0

WOMEN.

Description of Cloth.	Number.	Price.	Average Cost per Year.
		Rs. a. p.	Rs. a. p.
Lugrá - - - - -	1	0 8 0	0 8 0
Lahangá - - - -	1	1 12 0	1 12 0
Dhoti - - - - -	1	0 8 0	0 8 0
Choli - - - - -	2	0 4 0	0 4 0
Shoes - - - - -	1	0 6 0	0 6 0
Churi - - - - -	—	—	0 2 0
Khor - - - - -	1	1 0 0	0 8 0
Total - - - - -	—	—	4 0 0

BOYS.

	No.	Rs. a. p.	Rs. a. p.
Angochá - - - -	2	0 12 0	0 12 0

GIRLS.

	No.	Rs. a. p.	Rs. a. p.
Phará - - - - -	1	0 6 0	0 6 0
Ghangariá - - -	1	0 8 0	0 8 0
Churi - - - - -	1	—	0 2 0
Total - - - - -	—	—	1 0 0

The cost of clothing as above given, has been obtained from the proprietors and cultivators.

Under *miscellaneous expenditure* has been shown those charges which are incurred in addition to dieting and clothing; and considering the circumstances of the people, I do not think the charge is heavy.

Property and House Furniture.—The people generally hesitate to give out the cash and ornaments in their possession,—nay, many persons have concealed grains too, and did not state the full quantity in store. But the number and price of cattle shown in the statement may be accepted as correct. The description and value of houses are also trustworthy.

Debts.—The description of debts, as given by the proprietors, is not considered by me to be trustworthy, nor have we any data to verify their statements, especially as the inquiry was made in such a short time that it was impossible for me to obtain *bahi-khata*s and debts from the mahájans of each village,—so that the true state of the debts would have been brought to light. However, the amount of debts entered in the statement was according to the information received from the people.

The Famine Commission in question 9 have inquired the total amount of debts of the agricultural population, and the proportion which their debts bear to the total income. In my opinion it would not be judicious to base the debts of the whole district on the debts of the ten mauzas inquired into, as they cannot be relied upon. But I will show below the debts and income of these ten villages with their proportions:—

Debts of Proprietors.

No. of Proprietors.	Total Debts.	Total Income.	Remarks.
89	Rs. 56,469	Rs. 50,033	The debts exceed the income by $\frac{1}{5}$ and Income : debts : : 1 : 1.12.

Debts of Tenants with Rights of Occupancy.

No. of Tenants.	Total Debts.	Total Income.	Remarks.
81	Rs. 10,846	Rs. 21,743	It is evident that the debts of the tenants are nearly half of their income. Income : Debts : : 2 : 1.

AP. I. QN. 9.

NORTH-
WESTERN
PROVINCES
AND OUDH.unshi Zahid
Hussain.

Jaunpur.

As to the ordinary economic condition of such agriculturists generally they may be divided into three classes; (1) the well-to-do who do not work with their own hands but employ hired labour entirely; (2) the middle class who work with their own hands and also occasionally employ hired labour; and (3) the poor who work with their own hands merely. These for the most part live from hand to mouth, and are in a kind of servitude to usurers who let them have food and raiment only, but appropriate all the results of their labour. Generally cultivators grow or make all their own necessities; but some necessities connected with agriculture and their households they are compelled to buy. To the former belong implements of ploughing, reaping, sowing, irrigation, which altogether do not cost more than about Rs. 6 on an average for each cultivator, and to the latter belong clothes and condiments or tobacco. The cost of clothes is on an average about as follows:—

For a male cultivator of the well-to-do class—

Rs.	Rs. a.	Rs.
Clothes - 12	his wife's clothes - 8	0 his child - 1
Shoes - 1	Miscellaneous - 0	8
Tobacco - 3		
	8	8
	16	

For a male cultivator of the middle class—

Rs. a.	Rs. a.	Re.
Clothes - 5	8	3 14 child - 1
Shoes - 0	8	Miscellaneous - 0 4
Tobacco 2	0	
	8	0
	4	2

Mr. Spedding.
Gorakhpur.

I give a few notes on the position of the cultivator as regards—

- 1st.—His food.
- 2nd.—His household property.
- 3rd.—His dwelling-house.
- 4th.—His debts.
- 5th.—His clothing.

11. 1st.—As regards his food, the Gorakhpur people are essentially rice eaters. Bread is not consumed to any great extent. Ordinary cultivators in the cold weather eat *marua* cakes and boiled kodo. For vegetables they eat the shoots of the gram and "susna," a sort of clover which grows on the banks of tanks. They also eat the shoots of mustard (sarson) and *kesari dal*. The last is said to be very nutritious. They have a proverb "chār dīn *kesari khāe*, upar chār kos najae"; that is to say, a man who eats *kesari* for four days cannot walk four kos at the end. They also collect a weed called "bahua," which grows in the wheat fields, and boil it down as vegetables. In the hot weather they eat cakes of *jaukera*—that is, barley and peas grown together. They cook these cakes either on an iron plate (*tawa*) or in the ashes of a cowdung fire. The first they call "roti," the second "bhauri." They also sometimes cook in the following way:—After making the dough generally of *jaukera* or *gojai* flour, they work it up into long rolls. Then they take an earthen pot and put a little water in the bottom, and over it some *arhar* stalks, on which they lay the rolls, which are cooked by the steam from below. Sometimes they put some "dal" in the centre of the roll. This kind of roll they call "pita," when without dal it is called "para." These "pitas" are generally eaten by all Hindus, particularly Kayasths, on the "dawat puja," the third day after the feast of the Dewali.

In the rains they eat a kind of bread known as "mahwar." In the evening they soak some mahua in water with gram, peas, or linseed. Next morning they crush them all together and make a cake of the paste. They also sometimes eat a sort of pudding

For a male cultivator of the poorest class—

Rs. a.	Rs. a.	a.
Clothes - 2	4 his wife's clothes 2	2 child - 4
Shoes - Nil.		
Tobacco 0	12	
	3	0

As regards the kinds of houses occupied by cultivators in this district, they live in kutcha houses with tiled or flat roofs; the poorest class, however, live for the most part in thatched houses. The houses of the well-to-do alone have outhouses separate from the dwelling-house, and generally speaking their houses are surrounded by enclosures, but the houses of the poorest class never are. The dwelling houses have but two or three rooms with a verandah, and those with enclosures have one or two rooms in the enclosure used as outhouses. The well-to-do and even the middle classes of cultivators have in addition to oxen for the plough, cows and buffaloes, and some even have horses and camels, but the poorest classes have not even a sufficiency of plough-cattle, having to borrow from their neighbours who are better off. The surplus income is usually expended; (a), in marriages and funerals, or in (b), litigation. Indebtedness is as a rule caused by improvident expenditure in marriages, and funerals, in litigation, in paying interest and compound interest, and by loss of cattle and adversities of season.

I cannot even hazard a conjecture as to the proportion which their indebtedness bears to the average income of cultivators, but as far as I can ascertain about 60 per cent. of agriculturists are in debt, and about 35 per cent. of the indebtedness is inherited from their ancestors and 25 per cent. is personal.

called "latta," which is made of mahua, linseed, opium seeds, and ground gram (*sattu*) soaked and crushed up together. The very poorest people make a kind of bread called "makain," which consists of the husks of *arhar* ground up and mixed with a little flour. During the rains the poorer classes also eat a coarse bread made of mango kernels (*ām-ki-gutli*). This they call *hoeli-ki-roti*. In this season they also eat a dish called *matjawar*. They boil curds with water, and when it is partially cooked put in a little rice or kodon. In the hot weather they soak barley all night in water and next day strain and partially dry it. Then they husk it in a mortar (*okli*) and parch it as the *bharbhunjas* do. This they call "bahuri."

When the rabi and kharif grains are ripening they pick and parch the partially ripe ears or pods. That from gram, peas, and *arhar* is known as "horha;" that from barley and wheat in the rabi, and *tangun* and *sāwān* in the kharif, is known as "unu."

Sometimes they make small balls of dough and boil them in a pot with dal; these they call "dalpitti." They also sometimes boil them in milk, when they are called "dudhpitti."

The villagers call dal generally "paiti." When it is boiled up with vegetables (*sāg*) they call it "sāg paiti."

The villagers use the following plants as *sāg* in the cold weather:—*Bathua*, sprouts of gram (*chana*), sprouts of peas (*kirao*), *susna*, sprouts of *kesari*, flowers of the *konhra* gourd. In the hot weather they get no *sāg*. In the rains they get *karamua*, *surwari*, *uma*, *gadhepurnia*. About the end of the rains they collect and parch the grain of the *bhatwans*.

In the hot weather they collect the bark of the cotton tree (*semar*) and crush it and extract a sort of white powder, which they mix with flour and bake. They also use the roots of several marsh plants which they dig out of the dry beds of the lake and tanks; such are the *bhasihr*, *paundr*, *siki*, *kaulgatta*, *tal makana*, *ginni*, and *bera*. From the jungles they collect the seed of the *sāl* tree, the root of a plant

called *ganti*, the fruit of the *tendu* tree. They also get a long white root called the *ratār*.

Poor cultivators and day labourers generally eat thrice a day—once in the early morning before they go to work (this is called the "nihāri") and again in the middle of the day, which they call "dopaharia," and in the evening, which they call "sanjhagia." Such a man will eat in the morning a little parched grain (*bhunja*); at mid-day the cakes known as "bhauris" or parched grain flour (*sathu*) mixed with water or parched half ripe ears or pods (*norha*); at evening he will eat bread, dal, and rice, and vegetables.

Cultivators fairly well-to-do eat a little parched grain (*bhunja*) in the morning and bread or dal and rice, with vegetables, both at mid-day and again in the evening.

The low Hindu tribes, such as Chamars, Khatiks, Dharkars, &c., sometimes eat a little pig's flesh. They will also eat secretly the flesh of dead cattle. Similarly, the Muhammadan cultivators, such as Dhunias and Julahas, eat goat's flesh. All Hindus will eat fish, which is plentiful throughout the district. In particular Mallahs, Khewats, and Pasis regularly catch them for food. Kooris and Agarwala Baniyas will not eat fish or flesh.

The oil extracted from sarson, lahi or rai, tira, opium, kusum or burra is used in cooking vegetables. The oils from linseed, mahua, rehnri (castor-oil) are used only for lamps. The oils from opium seed or kusum (safflower) are considered particularly good for making the kind of cakes known as "puris." For this purpose they are even preferred to ghee.

When the sugarcane is being ground in the mill (*kolhu*) the labourers and the cultivator's family and friends drink the raw juice (*kacha ras*). They also eat the gur, rab, chota doma, tema, shakar, chini, misri, khaur, burra, which are products in various stages of the manufacture. A favourite food for labourers in the hot weather is "gattas," which are little balls of gur sprinkled over with a few grains of til (*sesamum*) or *ramdana*.

Poor cultivators and labourers eat the following sweetmeats which they buy from *halwais*:—*Gattas* (gur and til or *ramdana* seed), *lai* (made of parched grain and gur sold in balls), *lirna*, made of gur, gram flour (*besan*), and bitter oil (*karua tel*). They also eat most of the ordinary sweetmeats, with this difference, that in these sweetmeats for poor people gur is used instead of chini and oil for ghee.

Poor people also eat the following vegetables:—*kohra*, *lauki*, *bathua*, *taroi*, *ninwa*, *sathputia*, the stalks of the *ghunyan* or *arwi*. They also consume potatoes, carrots, phut, *suthini*, *kakari*, *penthul*, onions, *lahsun*, (*garlic*), *mircha* (*capsicums*), *turmeric* (*haldi*), *karaila*, *bhanta*, *ramtoriya*, *sem*, *kira*, *kharbuza*, *tarbuza*, *ganji*.

As for relishes, they eat a sort of mango pickle called *katai*, which is made up of *garlic* (*lahsun*), mint (*podina*), salt and *capsicums* with slices of mango.

The following cooking vessels are found in most homes of cultivators and labourers. The very poorest mostly use earthen vessels: such as *hawria*, *kondhas patki*, *parai*, *mitia*, &c. The better class have brass vessels, the *thali* for making dough and eating dal and rice, *lotah* for drinking, *tashli* (a broad saucer), *batuli* and *batula* for water, *gaghra* for drawing water, *katora*, *abkhora*. Of iron vessels there are the *tawa* (griddle), *karahi* (for cooking vegetables, &c.), *kalchi* (a spoon), *bujangi* (an iron cooking pot), *dal* (for bringing water). A man who cultivates 10 bighas will have vessels of sorts worth Rs. 8 or Rs. 10. He will have a grindstone (*chakki*) worth 10 annas, a pestle and mortar (*musal* and *okli*) eight annas, two or three beds (*kalia*) worth five or six annas each, a granary made of wicker or mud (*dehri kolla*), some reed mats, some baskets and a kind of box (*pitara*), grain measures (*sai*, *paili*, &c.), a grindstone (*sil*, *lorha*) for grinding curry, some ropes. Among tools he will have a *garasi* for cutting fodder and a *khurpi* spud for weeding, besides his plough, harrow, &c.

Q 3387.

Nothing is more remarkable in this district than the steady increase in the number of tiled houses. Dr. Buchanan notes that in some places prejudices continue against erecting them, and they are considered unlucky. This idea seems to have quite passed away. It is now usual to find in all parts of the district that a cultivator holding 10 bighas or more has a tiled house with the walls made of mud. Masonry houses are only used by *mahajans* or very large *zemin-dars*. The poorer cultivators or day labourers live in miserable thatched huts. In many cases there are no walls; hurdles made of brushwood or *arhar* stalks are used instead. Such huts are very liable to destruction by fire, which is common on windy nights in the hot weather. The house of a tolerably well-to-do cultivator consists of an enclosure with rooms all round. There is no door, a bamboo hurdle takes its place. Besides the rooms occupied by the owner and his family, there is a house in which the cattle are kept at night, and generally two others, one for chaff and the other for cowdung fuel. Outside there is an enclosure for cattle, and a shed in which they are fed during the day.

Debt.—The best native authorities whom I have consulted are of opinion that between 90 and 95 per cent. of the agricultural population are in debt. It is impossible to give an accurate estimate of the proportion of their indebtedness generally as compared with their annual income. These debts are usually classified by natives as—

- (a) "Beng," advances for seed.
- (b) "Biahi," for marriages.
- (c) "Bardahi" for purchase of cattle.
- (d) "Khawai" for food and other household expenses.

A great proportion of the small cultivators borrow their seed. The rate of interest is *siwai* or 25 per cent., or when the security is bad, *deorha* or 50 per cent. In a bad year even well-to-do cultivators borrow their seed. Last spring in the *Deoria tahsil* I found that most of the men who had planted sugarcane had mortgaged the standing crop for seed and food-grain. During the cold weather, I saw, as I marched through the *tahsil*, at nearly every cane mill agents of *Barhay mahajans* collecting the gur. The ploughman or *harwaha* class are, as a rule, so involved in debt that they can never hope to clear themselves. *Haidar Husain Khan*, a very intelligent *zemin-dar*, tells me that he has 50 *harwahas* who owe each on an average Rs. 60 or 70. I do not believe this is much overstated. Mr. Wynne's estimate of such a man's income gained by his own labour and that of his family is Rs. 59-6-8, which is possibly a little above the average. On this showing the ploughman class would on an average be indebted to the extent of one year's income.

Everyone who has watched the progress of the district since the mutiny notices increasing extravagance in the agricultural class. This is borne out by a comparison of Dr. Buchanan's notes with existing facts. This extra expenditure is incurred principally on weddings and funerals, and on clothes, vessels, and jewellery. The expenditure on weddings is enormously disproportionate to income. A well-to-do cultivator (*sai*) holding 30 bighas thinks nothing of spending Rs. 300 or more on a wedding. The improvement in dress is very noticeable. Before the mutiny English cloth was rarely if ever worn by the cultivating class. The facts I shall give further on will show the present state of things.

The cultivator disposes of his surplus savings in one of three ways; he hoards them, or lends them, or buys jewellery. As far as I can learn the practice of lending grain on usury at sowing time, and for food between the harvest, is increasing and extending to classes lower down in the social scale. The investigations which were made for the purpose of assessing the license tax, and some inquiries which I made myself last November regarding the seed grain supply, conclusively proved this. It is agreed on all hands that the jewellery supply is increasing. In *Salempur Majhau* pargana, after the cane and poppy harvest,

N n

CHAP. I. Q

NORTH
WESTERN
PROVINCES
AND OUDH

Mr. Spedd

Gorakhpur

CHAP. I. QN. 9. wandering jewellers go all over the country and make up ornaments in the villages.

NORTH-
WESTERN
PROVINCES
AND OUDH.
Mr. Spedding.
Gorakhpur.

As to clothes.—I have had a rough census taken of 500 individuals, of all classes, ages, and sexes, with the following result:—

75 per cent. wore native cloth only.
15 " " English and native cloth.
10 " " English cloth.
The average value of the cloth worn was:—
Men, country Rs. 2, English, Re. 1-12.
Women, " 3, " Rs. 2-14.
Children, " 1, " Re. 0-12.

Men who wear country cloth possess usually not more than three and not less than two cloths.

Those who wear both English and native have between five and three, and those who wear English alone between ten and four cloths or garments. As a rule, the dhotis worn by both men and women are native cloth. The head covering (márat) is usually

English long-cloth or nainsukh, worth from 2 to 3 annas a yard. The chadar or mirzai is commonly made of the same material. During last year the following was the value of English and native cloth brought into the city of Garakhpur.

English cloth Rs. 3,27,324, 82 per cent. on whole.
Native do. " 69,193, 18 ditto.

3,96,517

Besides this a considerable amount of cloth is made within municipal limits.

I now give balance sheets of several cultivators.

No. 1. Beni Madho Paure of Joth Behuria, pargana Bhowapur, cultivates bighas 8-15-1. His family consists of two men, three women, four children, in all nine persons. He has one plough.

Income.

Season.	Crop.	Amount under cultivation.	Produce per Bigha.	Total produce.	Selling price at Harvest.	Price.	Total.
Kharif	Sávan	B. b. d. 2 17 10	M. s. c. 4 0 0	M. s. c. 11 20 0	M. s. c. 1 20 0	Rs. a. p. 7 10 8	} 36 14 7
	Bhadain rice	1 3 7	8 0 0	9 13 9	0 20 0	18 10 8	
	Kodon	0 5 13	5 0 0	1 16 8	1 0 0	1 6 4	
	Arhar	0 18 7	5 0 0	4 23 8	0 20 0	9 2 9	
Rabi	Jaukerai (barley and peas)	1 15 10	8 0 0	14 8 0	1 0 0	14 3 2	} 116 6 1
	Wheat	4 8 11	7 0 0	34 19 9	0 16 0	86 3 11	
	Gram	0 18 7	5 0 0	4 23 8	0 20 0	9 2 9	
	Linseed	1 2 0	2 0 0	2 8 0	2 13 0	6 12 3	
	Miscellaneous income						
	Labour					5 0 0	
	Fees at harvests					2 0 0	
	Grand Total						160 4 8

His cattle consists of 2 bullocks.

" 3 cows.
" 3 calves.

AGRICULTURAL AND DOMESTIC EXPENSES.

Agricultural Expenses.

	Rs. a. p.	Rs. a. p.
Rent at various rates	- 13 6 0	
Seed	- 6 0 0	
Weeding	- 1 0 0	
Irrigation	- 1 0 0	
Reaping and threshing	- 2 0 0	
Ploughman—One man for four months at Rs. 1-8-0 per month	- 6 0 0	
Replacing cattle	- 3 0 0	
Repairs of ploughs	- 1 12 0	
Fees to barber and dhobi	- 1 12 0	
Fees to parohit	- 0 2 0	
		36 0 0

Domestic Expenses.

	Rs. a. p.
Food, average 6 pies per diem	- 101 4 0
Clothes	- 7 4 0
Vessels	- 3 0 0
Grand Total expenditure	- 147 4 0
Ditto income	- 160 4 8
Surplus of income over expenditure	- 13 0 8

He possesses the following property:—

	Rs.
Jewellery worth	- 12
Brass vessels	- 6
Clothes	- 12
Agricultural implements	- 5
	35

Rs. a. p.
His debts (contracted in three years) are—
Borrowed for his father's funeral - 25 0 0
And for rent and food - 55 0 0

He was sued for this and gave a bond for Rs. 125 in discharge of the original debt, with costs and interest - 45 0 0

Present debt therefore - 125 0 0

His House.—He has a tiled dwelling-house 30 feet long and 26 feet broad. There are four rooms and a courtyard inside. He keeps his cattle in this house, and he has in addition two sheds—one for fuel (gaen taula) the other for chaff (blusaula).

His Grain.—He has urd grain in his house at present. He lives now by labour or borrows a little from his baniya.

His Clothes.—He wears a pagri, a mirzai, a dhoti, and a chadar, all of native cloth:—

Pagri 2½ yards at 2 annas a yard.
Chadar 4 " "
Two dhotis 8 " "
Mirzai 2½ " "

His Food.—In the cold weather he and his family eat sávan, kodo, marua, maize tangum, and a little bhadain rice. In the hot weather he eats jaukerai and arhar. To pay his kharif rent he sells some rice, kodo, and sávan; to pay his rabi rent he sells wheat, gram, and linseed. He has one milch cow which gives a quarter seer of milk daily. His children drink it. He grows some gourds on his thatch, and in the spring gets bathua from his wheat fields. He sometimes buys from Koeris chaurar, and marsa. He grows a little arwi near his house. He uses as fuel coudung and arhar. The manure of his cows during the rains he puts on his field.

No. 4.—Janki Sentwar, of Rasálpur Jangia, pargana Haveli. His family consists of three men, four women, one child; eight in all. He cultivates bighas 14-10-0 with two ploughs.

Season.	Crop.	Amount under cultivation.	Produce per Bigha.	Total produce.	Selling price at Harvest.	Price.	Total.
Kharif	Bhadain rice	B. b. d. 10 15 0	M. s. c. 8 0 0	M. s. c. 86 0 0	Rs. a. p. 0 20 0	Rs. a. p. 172 0 0	} 190 12 0
	Cane	0 15 0	10 0 0	7 20 0	0 16 0	18 12 0	
Rabi	Wheat	3 0 0	7 0 0	21 0 0	0 16 0	52 8 0	} 58 10 0
	Linseed	1 0 0	2 0 0	2 0 0	0 13 0	6 2 7	
	Grand Total						249 6 7

His cattle consists of four bullocks.

His miscellaneous income.—Nothing admitted, probably his family make at least Rs. 10, by weeding, cutting, &c.

AGRICULTURAL AND DOMESTIC EXPENSES.

Agricultural expenses.

	Rs. a. p.
Rent Rs. 2 per bigha	- 29 0 0
Seed	- 33 0 0
Weeding kharif	- 10 0 0
Irrigation	- 6 0 0
Replacing cattle	- 2 0 0
Repairs of ploughs, and fees to village servants	- 3 0 0
Parohit	- 1 0 0
Preparing gur and cutting cane	- 5 0 0
Fees to barber and dhobi	- 3 0 0
Total Rs.	- 92 0 0

Domestic expenses.

	Rs. a. p.
Food at six pies per diem	- 90 0 0
Cloth	- 16 0 0
Vessels, average	- 2 0 0
Repair of house	- 1 0 0
Weddings, funerals, &c., average	- 15 0 0
Total Rs.	- 124 0 0
Total expenditure	- 216 0 0
Total income	- 249 6 7
Balance	- 33 6 7

He possesses the following property:—

	Rs. a. p.
Agricultural implements	- 5 0 0
Vessels	- 4 0 0
Clothes	- 6 0 0
	15 0 0

He owes - 30 0 0

He borrowed it for a wedding this year.

His house.—He has one thatched dwelling-house, 30 feet long and 26 feet broad. He keeps his cattle in his house at night, and has one small shed in which they feed during the day.

His grain.—He has no grain in his house store, but he has enough of rabi grain remaining to keep him on till his bhadin comes on.

His clothes.—He wears one pagri 18 yards country cloth, worth Rs. 1-4-0; angocha two yards English matapalan, two annas a yard; one chadar four yards English longcloth, three annas a yard; one pair shoes, worth 2½ annas.

His food.—He eats the same grain as No. 1.

No. 6.—Ilahi Iraki of Larh, tahsil Balia, pargana Salempur Majhau. He cultivates bighas 6-15-0. His family consists of one man, two women, three children; six in all. He has one plough.

Income.

Season.	Crop.	Amount under cultivation.	Produce per Bigha.	Total produce.	Selling price at Harvest.	Price.	Total.
Kharif	Kodon and arhar	B. b. d. 2 0 0	M. s. c. 5 0 0	M. s. c. 10 0 0	M. s. c. 1 0 0	Rs. a. p. 10 0 0	} 36 0 0
	Bhadai rice	1 0 0	8 0 0	8 0 0	0 20 0	16 0 0	
	Marua	1 0 0	10 0 0	10 0 0	1 0 0	10 0 0	
Rabi	Wheat	0 15 0	7 0 0	5 10 0	0 16 0	13 2 0	} 45 2 0
	Barley	2 0 0	8 0 0	16 0 0	0 20 0	32 0 0	
	Miscellaneous income.						
	Carrying grain with his pony						35 0 0
	Grand Total						116 2 0
	His cattle consist of two bullocks one pony.						

CHAP. I. QN. 9. AGRICULTURAL AND DOMESTIC EXPENSES.

NORTH-WESTERN PROVINCES AND OUDH.		Agricultural expenses.	
Mr. Spedding.		Rent, at Rs. 2-8-0 per bigha	16 14 0
		Seed, Kodon and arhar	1 8 0
		" Rice	2 0 0
		" Marua	0 4 0
		" Wheat	2 0 0
Gorakhpur.		" Barley	5 0 0
		Ploughman, 1 man for 8 months at Rs. 2 per month	16 0 0
		Carpenter and blacksmith, 12 annas each	1 8 0
		Replacing cattle	2 0 0
		Weeding kharif	6 8 0
		Irrigation	7 0 0
			60 10 0
		Domestic expenses.	
		Food, at 6 pies per head	48 0 0
		Clothes	6 0 0
		Vessels, earthen	0 8 0
			54 8 0
		Grand total expenditure	115 2 0
		Ditto income	116 2 0
		Balance	1 0 0

No. 7.—ESTIMATED INCOME and EXPENDITURE of a MAHTO or cultivator in easy circumstances supporting (say) a wife, one son married, one unmarried, one daughter, a brother with his wife, one son married and a daughter; in all 10 persons.

Extent of farm, 30 bighas worked with five ploughs.

Cr.		Income.					
Season.	Crop.	Amount under cultivation.	Produce per bigha.	Total produce.	No. of seers per rupee.	Price.	Total.
Kharif	Mash	B. b. 2 0	M. s. 4 0	M. s. 8 0	33	Rs. a. p. 9 11 2	Rs. a. p.
	Kodo	1 10	3 24	5 16	64	3 6 0	
	Rice broadcast	11 0	7 37	Uncleaned 87 7 Cleaned 48 25	32	60 12 0	
Jhurrun	Rice transplanted	6 0	10 36	Uncleaned 65 16 Cleaned 37 24	25	60 2 6	60 2 6
	Wheat	5 0	8 7	40 35	28	58 5 0	
Rabi	Do. and barley	3 0	5 16	16 8	42	15 7 0	
	Peas and do. Jan-kerai.	3 10	4 20	15 30	54	11 10 8	
	Urhar	1 10	6 0	9 0	28	12 13 9	
	Linseed	1 0	1 32	4 12 9	15	4 12 9	
	Masur	1 0	3 0	3 0	42	2 13 0	
	Gram	1 0	3 36	3 36	36	4 5 0	
	Mustard	1 10	4 8	6 12	18	14 0 0	
	Opium	1 10	0 8	0 11 1/2	—	56 4 0	
	Poppy seed	—	—	—	—	2 4 0	
	leaves	—	—	—	—	0 12 0	
	Sugarcane	1 0	16 gur.	6 0	14	45 11 3	
	Vegetables and tobacco.	0 10	—	—	—	8 8 3	
							237 10 5
Price of seven head of cattle sold in the year						70 0 0	115 0 0
Profits from loans of grain						45 0 0	
Total credit						—	486 10 1

The 30 bighas are suffered to be thus distributed, ek-fasla, one-half bigha opium, 1 sugarcane, 1 1/2 mustard, 2 mash, one-half vegetable and tobacco, 1 1/2 broadcast rice, 6 transplanted ditto, 5 wheat; do-fasla 3 bighas broadcast rice, followed by wheat mixed with barley, 3 1/2 ditto, followed by barley and peas, 3 ditto followed by masur, linseed, and gram, 1 1/2 kodo sown amidst arhar.

From the gross produce in columns 4 and 5 the amounts given for cutting and carrying have in all cases been deducted. These come to about 46 seers

He possesses the following property :—

Vessels	5
Jewellery	7
Agricultural implements	3
Clothes	7

He owes

Consisting of price of a pony	8
For food and clothes within two years	57

His house.—He has one tiled dwelling-house with four rooms. He lives in two, keeps his cattle in one, and his chaff in the fourth.

His clothes.—He wears :—

One murat, four yards English nainsukh, at four annas a yard.	
One mirzai, 1 1/2 yards ditto markin, at 4 1/2 annas a yard.	
One dhoti, four yards ditto longcloth, three annas a yard.	
One lungi, 2 1/2 yards country cloth, 2 1/2 annas a yard.	
One pair of shoes cost three annas.	

Dr. Agricultural expenses.

Dr.	Rs. a. p.	Rs. a. p.
Seed for 2 bighas, mash	0 7 0	
" 1 " 1/2 kodo	0 2 0	
" 11 " broadcast rice	5 8 0	
" 6 " transplanted	2 11 6	
" 5 " wheat	8 0 0	
" 3 " and barley	2 10 12	
" 8 " 1/2 peas	1 8 0	
" 1 " 1/2 arhar	0 1 11	
" 1 " linseed	0 10 8	
" 1 " masur	0 6 0	
" 1 " gram	0 12 0	
" 1 " 1/2 mustard	0 6 0	
" 1 " 1/2 opium	0 5 0	
" 1 " sugarcane	2 0 0	
" 1/2 vegetable and tobacco	1 8 0	
		27 0 3
Labour.		
Three ploughmen at Rs. 18	54 0 0	
Weeding poppy and vegetables	3 6 0	
Weeding and sowing miscellaneous	6 6 0	
Irrigating five bighas wheat at Rs. 10	3 2 0	
Irrigating three bighas poppy, sugarcane, &c., at Rs. 3	9 0 0	
Collecting opium, one half bigha	3 0 0	
Manufacturing the gur	8 0 0	
		86 14 0
Miscellaneous.		
Hire of sugar mill	2 4 0	
Earthen vessels for sugar	1 0 0	
Barhai for mending sugar mill	0 8 0	
Ahir for watching cattle	1 0 0	
Abwab; fees to village servants	7 1 4	
Fees to Brahmins at harvest	1 0 0	
		12 13 4
Land rent three bighas, poppy, &c., at Rs. 4-8-0	13 8 0	
Land rent six bighas jhurrun at Rs. 2-2-0	12 12 0	
Land rent five bighas wheat at Rs. 2-2-0	10 10 0	
Land rent one-half bigha mustard at Rs. 2-0-0	3 0 0	
Land rent 11 bighas dofaslas, at Rs. 1-12-0	19 6 0	
Land rent 3 1/2 bighas ekfasla kharif at Rs. 1-4-0	4 6 0	
		63 8 0
Total agricultural		190 3 7

Dr. Expenditure.

Description.	Seers per rupee.		
Food.			
Atta, wheat	M. s. c. 29 10 0	27	Rs. a. p. 15 0 0
Rice	21 0 0	28	30 0 0
Dal	13 0 0	33	15 12 0
Salt	1 5 0	4 1/2	10 0 0
Oil	0 22 8	4	4 0 0
Gur	1 0 0	14	2 13 0
Tobacco	—	—	4 0 0
Vegetables and seasoning	—	—	5 0 0
Pan on festivals	—	—	2 0 0
			119 3 0
Clothes.			
Men: 15 dhotis at	Rs. a. p. 0 12 0		11 4 0
5 pagris	1 4 0		6 4 0
5 mirzais	0 10 0		3 2 0
8 angochas	0 4 0		2 0 0
6 chadars	1 4 0		7 8 0
5 pairs shoes	0 4 0		1 4 0
Women: 8 saris	0 15 0		7 8 0
4 do. girls'	0 9 0		2 4 0
4 chadars of nainsuk	2 0 0		8 0 0
5 razais every second year, Rs. 1-4-0; total Rs. 6-4-0, annual	—		2 1 0
4 ceremonial dresses for the women, Rs. 3-8-0; total every third year, Rs. 14-0-0, annual	—		4 10 8
3 blankets every second year at Rs. 0-14-0; total Rs. 2-10-0, annual	—		1 5 0
2 toshaks every third year at Rs. 1-8-0; total Rs. 3-0-0, annual	—		1 0 0
2 eksutti daris every third year at Rs. 2-4-0; total Rs. 4-8-0, annual	—		1 8 6
Jewellery cost about Rs. 140. Renewing and repairing at 14 per cent.	—		19 9 7
Household vessels cost about Rs. 26	—		6 8 0
Renewing and repairing at Rs. 25 per cent.	—		—
House, original cost Rs. 70-0-0, repairing annually	—		9 0 0
			35 1 7

CHAP. I. QN. 9.

NORTH-
WESTERN
PROVINCES
AND OUDH.

Mr. Spedding.

Gorakhpur.

Description.	Seers per rupee.	Rs. a. p.	Rs. a. p.
Furniture: 2 muchias (straight backed stools) - - - - -	-	2 0 0	
2 beds of Saku at Rs. 1-8-0 - - - - -	-	4 8 0	
5 beds of bamboo bansutwas at Rs. 0-12-0 - - - - -	-	3 12 0	
Repairing and renewing at 16 per cent. - - - - -	-	-	1 11 4
Earthen vessels - - - - -	-	-	0 7 8
<i>Agricultural Implements.</i>			
5 picughs at - - - - -	Rs. a. p.	10 0 0	
1 harrow (henga) - - - - -	1 4 0	1 4 0	
2 rakes (panjha) - - - - -	0 2 0	0 4 0	
4 kodalis - - - - -	0 10 0	2 8 0	
5 baskets for sowing (ora) at - - - - -	0 1 0	0 5 0	
5 sieves (chalna) - - - - -	-	0 2 0	
Repairing and renewing, exclusive of ploughs, at 25 per cent. - - - - -	-	-	1 2 0
Cattle: 10 bullocks at Rs. 12 each - - - - -	-	120 0 0	
Renewing ditto, every eighth year - - - - -	-	-	15 0 0
Abwab, Amihmani or feast to relations - - - - -	-	2 0 0	
Pujah three times a year at Rs. 2 - - - - -	-	6 0 0	
Teohars, six in the year at Rs. 1-8-0 - - - - -	-	9 0 0	
A marriage or a funeral at Rs. 50 to 70 once a year - - - - -	-	12 0 0	29 0 0
Total - - - - -	-	-	261 5 4
<i>Summary.</i>			
Cr. Total returns - - - - -	-	-	476 10 1
Dr. Expenses, agricultural - - - - -	-	190 2 7	
Food - - - - -	-	119 3 0	
Clothing - - - - -	-	59 10 11	
Miscellaneous - - - - -	-	92 6 7	461 6 1
Balance Cr. - - - - -	-	-	15 4 0

The atta will have been ground and the rice cleaned by the women of the household; one seer in 28 is allowed for loss by grinding.

The village mochi will also give five pairs of shoes in return for the hides. The house will be partly tiled and partly thatched; the walls wholly of mud.

The kanchas and other baskets required will be made by the household itself.

Besides this, presents in money and clothes will have been made to relations, but these gifts balance each other in the long run.

No. 8.—ESTIMATED INCOME and EXPENDITURE of a small cultivator cultivating six bighas with one plough and supporting a wife, one son of 18, one of 14, and a daughter of 10 years, in all four persons besides himself.

Season.	Crop.	No. of bighas.	Produce per bigha.	Total produce.	No. of seers per rupee.	Price.	Total.
Kharif	Mash - - - - -	B. b. 1 0	M. s. 4 0	M. s. 4 0	33	Rs. a. p. 4 13 7	Rs. a. p.
	Rice broadcast - - - - -	2 10	7 37	{ 19 32 uncleaned - 11 15 cleaned - }	33	13 12 7	
Jarhan	Do. transplanted - - - - -	1 0	10 36	{ 10 36 uncleaned - 6 11 cleaned - }	26	9 10 6	
Rabi	Wheat - - - - -	1 0	8 7	8 7	29	11 4 5	
	Do. and barley - - - - -	1 0	5 16	5 16	43	5 0 4	
	Peas and barley - - - - -	1 0	4 20	4 20	55	3 4 4	
	Mustard - - - - -	0 10	4 8	2 4	19	4 6 9	
	Linseed - - - - -	0 10	1 32	0 36	16	2 4 0	54 8 6
<i>Earnings of Family.</i>							
	Sowing kharif and transplanting jarhan, three months - - - - -	-	-	-	In grain. M. 16	In money. Rs. a. p. 13 4 0	
	Cutting kharif and carrying ditto. 15 days, at 8 seers - - - - -	-	-	-	3	3 12 0	
	Do. jarhan ditto. 10 do. - - - - -	-	-	-	2	2 10 8	
	Do. rabi ditto. 30 do. - - - - -	-	-	-	6	7 8 0	
	Miscellaneous, e.g. weeding, collecting opium, building mud walls, six months - - - - -	-	-	-	-	11 0 0	38 2 8
	Cattle, two head sold every three years - - - - -	-	-	-	-	6 0 0	6 0 0
	Total credit - - - - -	-	-	-	-	-	98 8 8

The six bighas will be thus distributed, ek-fasla 1 bigha mash, 1 bigha jarhan, 1 wheat, $\frac{1}{2}$ mustard; dofasla 1 bigha broadcast rice followed by wheat and barley) gojai), 1 bigha ditto followed by peas and barley (jaukerai), $\frac{1}{2}$ bigha ditto followed by linseed.

The rates in column 6 differ somewhat from those given in the preceding statement, as the small cultivator will be obliged to sell in a cheaper market than the mahito.

The earnings include the profits from gleaning.

Dr.	Rs. s. p.	Rs. a. p.
Seed 2 bighas broadcast rise - - - - -	2 0 0	
1 do. transplanted do. - - - - -	0 7 6	
1 do. mash - - - - -	0 13 6	
1 do. wheat - - - - -	1 9 7	
1 do. do. and barley - - - - -	0 13 6	
1 do. peas and do. - - - - -	0 10 8	
10 do. mustard - - - - -	0 2 0	
10 do. linseed - - - - -	0 5 4	
	6 4 1	

Irrigating 1 bigha wheat, 14 out-siders at Re. 0-1-3 - - - - -	1 1 8
Fees to village servants (Jeura) - - - - -	2 8 0
Repairing plough, &c. - - - - -	0 12 0
	4 5 8

Land-rent 2 bighas 10 biswas do-fasla at Re. 1-12-0 - - - - -	4 6 0
1 do. do. transplanted rice Rs. 2-2-0 - - - - -	2 2 0
1 bigha wheat Rs. 2-2-0 - - - - -	2 2 0
10 do. mustard at Rs. 2 - - - - -	2 0 0
1 do. mash Re. 1-4-0 - - - - -	1 4 0
	11 14 0

Total agricultural expenses - 22 7 9

Description.	Amount.	No. of Seers per Rupee.
<i>Food.</i>		
Atta wheat - - - - -	M. s. 6 10 28	8 14 0
Do. do. barley 10 0 - - - - -	43	9 5 0
Rice - - - - -	8 11 32	13 7 6
Dal - - - - -	4 0 33	3 10 2
Oil - - - - -	-	1 12 0
Salt - - - - -	0 21 4 $\frac{1}{2}$	4 10 8
Vegetables and seasoning! - - - - -	-	2 5 4
Tobacco - - - - -	-	1 4 0
Pan on festivals - - - - -	-	0 8 0
	-	44 12 8

<i>Clothing.</i>		
1 razai at Re. 1-4-0 - - - - -	1 4 0	
1 blanket - - - - -	0 14 0	
2 dhotis large, 10 annas each - - - - -	1 4 0	
2 do. small, 6 annas each - - - - -	0 12 0	
2 angochus, 4 annas each - - - - -	0 8 0	
1 pagri, Re. 1 - - - - -	1 0 0	
2 chaddars, 12 annas each - - - - -	1 8 0	
2 saris, 13 annas each - - - - -	1 10 0	
1 sari for holiday wear at Rs. 3-8-0, once in three years - - - - -	1 2 8	
1 pair shoes - - - - -	0 4 0	
	10 2 8	

Ornaments, total cost Rs. 18, renewed every four years - - - - -	4 8 0
Household vessels 7, cost Rs. 9, renewed every three years - - - - -	3 0 0
Cattle, 2 bullocks, cost Rs. 20, renewed every eight years - - - - -	2 8 0
	10 0 0
Abwab puja - - - - -	2 8 0
Six teohars, at 8 annas each - - - - -	3 0 0
A funeral or a marriage at Rs. 15, once every seven years - - - - -	2 2 1
	7 10 1

Total - - - - -	95 1 2
<i>Summary.</i>	
Cr.—Total return - - - - -	98 11 2
Dr.—Agricultural expenses - - - - -	22 7 9
Food - - - - -	44 12 8
Clothing - - - - -	10 2 8
Miscellaneous - - - - -	17 10 1
	95 1 2
Balance Cr. - - - - -	3 10 0

In the article food, the number of seers per rupee is given, not at the bazar rate, but at that given in the statement of return, as the amount will simply be deducted from the agricultural produce.

The house will be built of mud or matting and will cost the owner nothing but his own labour for repairs.

Generally a cultivator, such as is here described, is in debt to his zemindar. In that case not only will the balance of the profit shown above be swallowed up, but he will be continually incurring fresh debt.

No. 9.—Estimated Income and expenditure of a ploughman with the same family as in Part II.

	In Grain.	In Money.	Total.
<i>Wages as ploughman -</i>			
Earnings of wife and children - - - - -	M. S. 18 0 0	Rs. a. p. 18 0 0	
Sowing kharif and transplanting jarhan, three months - - - - -	17 0	14 4 0	
Cutting and carrying kharif, 15 days - - - - -	3 0	4 0 0	
Ditto ditto jarhan, 10 days - - - - -	2 0	2 10 8	
Ditto ditto rabi 30 - - - - -	6 0	7 8 0	
Miscellaneous labour during remaining six months - - - - -	-	13 0 0	59 6 8
<i>Dr. Food.</i>			
Atta, wheat - - - - -	4 0	5 12 6	
Do. do. and barley mixed - - - - -	10 0	9 4 7	
Rice - - - - -	4 0	5 0 0	
Masur, lentils - - - - -	5 0	4 10 5	
Dal - - - - -	4 0	4 13 7	
Salt - - - - -	0 10	2 3 7	
Oil - - - - -	-	0 14 0	
Seasoning - - - - -	-	0 6 0	
Tobacco - - - - -	-	0 12 0	
Liquor - - - - -	-	3 8 0	37 4 8
<i>CLOTHING.</i>			
3 Blankets at 14 annas in two years - - - - -	-	1 5 0	
4 Dhotis large and small at Rs. 0-7-6 - - - - -	-	1 14 0	
2 Pigris in 3 years at 12 annas - - - - -	-	0 8 0	
2 Angochas - - - - -	-	0 8 0	
2 Saris - - - - -	-	1 8 0	
1 Chadar - - - - -	-	1 0 0	
1 Sari and lengha for holiday wear at Rs. 4, once in 4 years - - - - -	-	0 8 0	7 3 0
Household vessels 5, costing Rs. 4 every third year - - - - -	-	1 5 4	
Ornaments, costing Rs. 2-13-0 every fourth year - - - - -	-	0 11 0	
Pujah - - - - -	-	0 12 0	
Teohars, six in the year—money spent in drink - - - - -	-	1 14 0	4 10 4
Total expenditure - - - - -	-	-	49 1 12
Balance - - - - -	-	-	10 4 8

This balance is only nominal. The interest on the debt for the marriage swallows it up. The class whose expenditure is here detailed go into debt for every fresh marriage or funeral, and work out the amount. Generally, indeed, Rs. 18 wages are not given at all, but in its stead only sufficient food to support life while the debt is being worked out.

The earnings, include in all cases the profits from gleaning.

CHAP. I. QN. 9.

NORTH-
WESTERN
PROVINCES
AND OUDH.

Mr. Crooke.

Gorakhpur.

Mr. Crooke, Gorakhpur.—Complete accuracy as to the average amount of food consumed by the labouring and cultivating classes cannot be expected. It is only people who buy every day a fixed ration of grain from a bania who can state accurately the amount which they consume. The agriculturist, on the other hand, who has grain in his house, is not so careful in fixing his daily ration; while his granary is full he eats as much as he wants, and in hard times, or just before the harvest comes in, goes on short-comings. Again, in most families, of this class the food is all cooked together, and the family eat at the same time. Under these circumstances no regular classification of rations is possible. Further than this, in endeavouring to fix the average ration of the labouring and poor agriculturist class, there is a varying disturbing element for which it is very difficult to account. Beyond the grain ration these people consume a very large quantity of vegetables, which vary in amount and quality at the different seasons. Hence, the actual weight of the grain ration is not a satisfactory indication as to whether they obtain the requisite amount of nutriment.

The grain ration for adult men.—All the inquiries I have made go to show that, in this district, the maximum ration of grain, under the most favourable circumstances, is one Gorakhpuri seer weighing 100 Gorakhpuri pice, or corresponding to 1.13 Government seers, or 2.9 lbs. This seems to be the maximum weight of cooked grain in the form of bread, boiled rice, dal, &c. that a working agriculturist will eat in cold weather.

My inquiries show that, about 40 per cent. of this ration is consumed in the forenoon and 60 per cent. at night. But it is most important to remember that, except in the case of large cultivators, the forenoon ration does not include any regularly cooked food, except the "bāsi" or fragments which have remained over from the last evening's meal, which are eaten in the morning as the labourer starts to his work.

The estimate for purely cooked food will not apply to what is usually the case, the cultivator or labourer eating "sattu," that is, parched gram, barley, &c. ground, or "chabena," that is, parched grain in the forenoon. It is generally admitted that, in this case, the cultivator's ration, at the best of times and with the hardest work, will not exceed six chittacks Gorakhpuri weight of sattu and half a seer of grain. That is to say,—

Grain = 0.565 Government seers.
Sattu = 0.423 "

.988

that is, in round numbers, a seer of grain of sorts, Government weight.

It is perfectly clear that this ration of a Gorakhpuri seer of grain per diem is a purely ideal one for the labourer or cultivator here, and rarely, if ever, realised in fact. Respectable natives always lay it down as the assumed maximum ration, because, as I am informed, it is the estimate which they follow in preparing food at large assemblages of their friends and relations, such as at marriage feasts, &c. But in such cases, it is manifest that considerable allowance must be made for wastage, and the estimate is probably framed so as to leave something over for beggars or servants.

From inquiries I find that, at the present time, my own grasscutters, who receive Rs. 4 per mensem, and are certainly much better off than a village labourer, regularly eat 12 Government chittacks of grain per day, out of this 9 chittacks are rice and 3 dal. At current rates this ration, with salt and spices, costs exactly one anna. So the food of these men cost them about 1/8s. 2 per mensem, or half their wages. Their ration would be—

75 government seers,
1.92 lbs. avoirdupois.

The average agriculturist's ration is far from being as good as this. From what I can make out, a fair all-round average in ordinary years for a whole family is 9 chittacks government weight per head; that is, equal to .562 of a government seer or 1.44lbs. avoirdupois of grain, or 5.12 government maunds per head per annum.

This must be understood to be a generally estimate for the whole agricultural proportion, including cultivators and labourers. After working out these figures I compared them with Mr. Moen's estimate for Bareilly (Settlement Report, page 54): curiously enough, they agree exactly with his results for the jail dietary. Now, it has always been admitted that the peasant of Rohilkhand is better fed than his Gorakhpur brother, and this fact may be brought to show that my estimate is an excessive one. The explanation of this is easy. Mr. Moen's estimate is for a population mainly consuming the better class grains, such as wheat, barley, and rice, while mine is for people habitually eating innutritious grains, such as kodon, marua, sawan in the autumn harvest, and barley and peas in the spring harvest. On an average, the Gorakhpur and Rohilkhand peasant probably both eat about the same weight of grain, but the usual food of the latter is probably 25 per cent. more nutritious than that of the former.

It is very difficult to find out exactly what the day labourer (whom it is most important to consider from the famine point of view) eats. In this neighbourhood I find that the masters give their ploughmen 12 government chittacks of any grain available at the time per day and Re. 1 in cash per mensem. On pay like this it altogether depends on circumstances whether he is able to support life fairly, or lives in a normal state of semi-starvation. If he has only himself to provide for, he can keep body and soul together. But if he has a sickly wife or a number of young children, he can only live in the most wretched way. On the other hand, if his wife and children can work for their own support, he struggles on as long as work is available for them. But a drought that stops weeding or irrigation throws him on the parish at once. There are infinite degrees in the position of these men. If he is a chamar, he sometimes gets a pice as a perquisite, or his wife gets a present for acting as midwife, and when labour is scarce of course he takes advantage of it. Just now, when there is a demand for labourers for irrigation, women, who would gladly work for 3 pice per diem at other seasons, are standing out for 7 pice and a meal of parched grain.

As to women's grain diet. It appears that their diet during the irrigation and weeding season is very little, if at all, below that of the men.

As to children. It is impossible to calculate their diet with any accuracy. They generally get something four times a day, and a good deal of their daily food consists of milk.

As to salt. The labourers and poorest cultivators estimate, as a rule, 1 Gorakhpur pice weight per diem. This is, I believe, more than what is used by these people on an average. This class seems to eat more salt, on an average, than those better off. Probably the reason is that they require more to make their vegetables palatable. This amount of salt gives, by my calculations, an all-round average of about 204 grains per head per diem. The jail allowance is only 150 grains. Probably my average is somewhat high. No cultivator regularly weighs his salt. He only puts a pinch or two into his dal to suit his taste. If he takes a pice weight per diem, his annual consumption would be four seers, costing at current rates 13 annas.

As to tobacco, &c. Most adult men smoke more or less. Very few women among the agriculturists smoke. The kahars and mallahs smoke ganja largely. From what I can learn an average cultivator's tobacco bill is about Re. 0.1-6 per mensem, or about a rupee per annum.

Firing costs nothing. A cultivator's food is also supplemented by a little ghi, and in most parts of this district very considerably by fish. Sugar is very little eaten except in the form of sweetmeats at

festivals, but the juice of the sugarcane and treacle are largely consumed by the poorer classes in the cold weather and spring months.

Mr. Benett, after making inquiries in 10 villages, writes:—

A few of the answers obtained are unquestionably accurate. The number of souls to the family, the area of cultivation, the rent, the number of plough, cattle and other stock, and the description of house, are all correctly given. I feel less confidence in the return of other sources of livelihood, though that too is probably correct in the majority of instances, and in the statement of debts.

I attach very little value to the accounts given of the actual gross produce, its value in money, the cost of seed, and weeding, watering, and ploughing; while for the expenses of living I almost invariably got one answer,—Rupee 1 per month for each soul in a family for food, and from Rs. 2 to 4 per annum for clothing. I am indeed convinced that it is absolutely impossible to get correct answers to any of these questions by direct inquiry. The people themselves have not the requisite knowledge. They feel, when asked, much as an English peasant might feel if a Sanitary Commissioner were to inquire of him what weight of animal and vegetable food, and what value of liquid he consumed in a year, how much of each he assimilated, and how much he rejected from his system.

When the grain is carried to the threshing floor a number of dues have to be paid out of it, covering a very large share of the expenses of cultivation. The cutters get one basketful in sixteen, and if paid in grain, the labourers get their wages served out to them. The village servants all take their dues from the heap. At one side may be seen a row of miserable old women and beggars, each of whom gets a double handful, for the native on these occasions is very liberal; while, probably, if the grain is of a superior kind, wheat or rice, the servant of the money-lender or the zamindar is present to carry off an equivalent for his interest or his rent. Of the whole crop, the latter is the only item that is commonly weighed. Whatever he can save, the cultivator takes to his house for the consumption of himself and his family. He may have a rough idea of what this weighs, but he certainly never thinks of making an addition of the whole produce.

In the same way with regard to expenses of cultivation. He buys an ox occasionally when he has saved or can borrow the money, but he has no idea of what the average expense per annum on this account comes to. If he keeps a ploughman, as most well-to-do cultivators do, he knows that he costs him Rs. 24 per annum, with an occasional dole of coarse grain; but the occasional labourer he employs on irrigation and weeding is paid sometimes in cash and sometimes in grain, both at various rates; sometimes he exchanges his labour for that given on another day by a neighbouring cultivator; and I am quite sure that he however precise an answer he may give, he has only the vaguest idea of what the cost has really been.

It is the same in the matter of food for himself and his family. The greater part is provided by the produce of his own fields, and he keeps no account of what he pays for the remainder.

The houses of cultivators for which I got returns were almost all above the average in position in the community. I proceed to give an analysis of the results of the inquiry of 34 houses:—

	B. b. b.
The average area of cultivation per house	11 15 0
Ditto ditto per soul	1 13 0
Average of souls per family	7 0 0
	M. s. c.
Average produce per bigha	6 23 0

Q 3387.

	Rs. a. p.
Average value of a maund of grain	2 5 0
Average value of outturn per bigha	5 3 0
Ditto rent	4 3 0
Ditto expenses	4 0 0
Ditto profits	7 0 0
Annual profits per family	80 0 0
Ditto ditto per soul	11 0 0

As these results have no pretensions to accuracy, I have not worked them out with minute exactness.

Of the 34 families 16 have other property, generally small mango grooves, or assignment for service.

Eighteen are in debt to the amount of Rs. 2,102-2-0. The annual income of these houses is given at Rs. 891-14-5; but as five of the eighteen are in Samesi, where the cultivators will not admit that they have a greater income than about eight annas per soul per annum, it would perhaps be safe to double this.

In three villages, for which the returns were in other respects so inaccurate that I have been unable to use them, 12 cultivators out of 13 were returned as in debt. But the debts were not heavy, and the villages had suffered with exceptional severity from the drought. In the whole district my conclusion is that about 60 per cent. of the cultivators are in debt to the amount of about one year's income.

It is impossible to give any vague idea of the condition of the agricultural classes, without discussing a problem of immense intricacy. A few salient considerations are all that I am capable of dwelling on.

In the first place, I have no doubt that the gross outturn is habitually understated. Pandit Davi Parshad, who has had immense experience, gives it as his opinion that in ordinarily good years 12 maunds per bigha is a poor crop, 16 maunds a fairly good, and 20 maunds an exceptionally good, but not uncommon outturn. Mir Fida Ali, the manager of the Raja of Salempur's estates, estimates the produce rather lower, and these estimates correspond fairly with the results of my own experience. Two or three crops of the commoner kinds of the grain, which is the bulk of the food of the agricultural classes,—kodon, juar, Indian corn, millet and arhar,—are raised from the same land in the same year, and the produce is often very heavy. I have seen fields this year where 25 maunds of juar per bigha have been harvested, and where 10 to 15 maunds of arhar may be expected in the spring.

The expenses of cultivation vary with the caste of the cultivator. Seed is the same for all, and the most expensive crop in this respect is wheat, of which a maund is sown to the bigha. The other crops take much less; and allowing that seed is more expensive than food grain, when the cultivator has to apply to a mahajan for it, I do not believe that the average cost of seed exceeds rupee 1 per bigha.

If the cultivator is a Brahmin or a Thakur, he must engage a ploughman for at least six or seven months in the year, at rates varying from Rs. 2 to R 2-8 per mensem. In farms of any size the expense of labour for irrigating, weeding, and gathering in are considerable. In small farms most of these operations can be done by the tenant and his family. I do not believe it possible to make any general estimate of these expenses. The variation on each side of an extensive average would be so great as to deprive the average of all value.

If great and small consume 12 chittacks of grain per diem, and this is everywhere admitted to be a fair allowance, a family of four persons will consume 27 maunds in the year.

CHAP. I. Q.

NORTH-
WESTERN
PROVINCE
AND OUDH

Mr. Bene

Lucknow

CHAP. I. QN. 9.

NORTH
WESTERN
PROVINCES
AND OUDH.

Mr. Bennett.

Lucknow.

I now consider the case of a tenant with family of four souls, holding a farm of five bighas. His rent is Rs. 21 per annum, for which he will require 16 maunds of wheat, which he can raise from 13 bighas. He will not probably consume more than the produce of Rs. 2 as food, and $1\frac{1}{2}$ bighas will be left to provide clothes, salt, agricultural instruments, seed, and labour. In my opinion a cultivator of this class would be in a position of what is regarded as moderate comfort, but he would be quite unable to save, and an exceptionally bad harvest, even if far short of total failure, would reduce him to extreme destitution.

The agricultural labourer never has any live stock or any property to supplement his scanty earnings: while agricultural labour is to be had, he is paid at various rates, which on an average, bring him in about Rs. 2 per mensem. He gets 9 pies a day for weeding, and this is generally done by women and boys; for digging or making irrigation trenches, 1 anna per diem; for watering, from 1 anna 3 pies to 2 annas; and when he is paid in kind he gets five or six local seers, that is 4 to 4½ lbs. of the coarsest kinds of grain. Employment in the fields cannot be had for more than seven or, at the outside, eight months in the year, and for the other months he keeps himself alive by selling grass when he can,—an occupation at which he may earn 9 pies per diem, or doing jobs

on the roads, or in the last extremity eating unwholesome weeds, which do more quickly the work of starvation. He can rarely afford to buy clothes, and keeps himself warm by creeping under a pile of straw. In the late famine in Rae Bareilly the straw had been all consumed by the cattle, and the earlier deaths were rather attributable to cold acting on great want, than to direct starvation. Starvation commenced on the day when a heavy rain obviated the necessity of employing labour for irrigation.

To resume: of the whole rural population from 20 to 25 per cent. have some kind of trade. Only a few of these can be considered as even moderately rich, and on the other hand there are not many who live habitually on the border line of starvation. Of the 65 to 80 per cent. who are true agriculturists, more than a fourth are day labourers, and are never far removed from that line. I have selected five bighas as a farm which will enable an average sized family to live in fair comfort in average years, and keep them from starvation except in times of actual famine. A third of the agricultural population hold farms of more than five bighas each. Nearly 40 per cent. of the agriculturists, or about 30 per cent. of the whole population, hold farms of a less area than this; and though raised above the utter destitution of the day-labourer, have but at the best a precarious livelihood.

BENGAL.

BENGAL.

Mr. Toynbee.

It is impossible to give a general answer to this question which would apply with any degree of accuracy even to so small a unit of administration as a district, so much depends on the tenures of land, on the caste of the people holding it, on local customs, on harvests and seasons, the pressure of the population on the soil, and a host of other circumstances;—to say nothing of the difficulty of fixing a standard of prosperity or adversity independent of the vast differences in individual opinions. This much may, however, safely be said, that the classes who possess any kind of proprietary rights, or any occupancy right in the land which is duly respected by the landlord, are generally raised above the reach of famine. Many of them are in debt owing to the pernicious custom of the country which entails an expenditure on marriage and other religious ceremonies quite out of proportion to the means of the persons incurring it, and who have generally to borrow at high rates of interest to meet it. But there can be no doubt that within the last few years the ryots of Lower Bengal have, owing to the springing up of the jute manufacture and the high prices of all agricultural produce, taken a great step towards putting themselves on a better and more independent footing. Tenants-at-will and those whose rights of occupancy are not respected even if they possess them, live, it must be confessed, very much from hand to mouth. Similar to that of the last-men-

tioned class is the condition of the agricultural labouring classes, though in many parts of the country they too have recently been able to force up their rate of wages. If by being in debt it is meant that a Bengal ryot is in arrear with his rent, debt is a very common incident even in districts where the cultivators are known to be prosperous. Indebtedness to the village mahajan and indebtedness to a landlord, when they are not one and the same person, are two very different things. It is impossible to estimate what proportion of the agricultural population is in debt to the former, but it is certainly very considerable in most parts of Bengal. The ryots are as a body uneducated and thriftless, and have not yet learnt to hoard. They are thus constantly borrowing, though the high prices of late years have enabled many of them to shake off to some extent the hold which the mahajuns had over them. In comparison with those of Eastern Bengal, Chittagong, and Orissa, the ryots of Behar are very badly off. Those in the western and central are not so prosperous as those in the eastern districts. Though there has been a general tendency on the part of landlords in Bengal, and especially in Behar, to ignore and encroach upon occupancy rights, yet one of the chief causes of the poverty of the cultivating classes is undoubtedly their own improvidence and their wasteful expenditure on marriage and other ceremonies.

	Rs.		Price.
Other household expenses	18		
Seed	9		
He has—			
Huts	3	of very small dimensions, one for cooking, one for the cattle, and one to live in.	
Bullocks	3		
Cow	1		
One brass ghutty	0 12 0		
Thalee (plate)	1 0 0		
Two earthen pots for water (kuls)	0 1 6		
Ten ditto handy for cooking	0 2 6		
Four ditto dishes	0 2 0		
Four ditto small pots for keeping salt, oil, &c.	0 1 0		

The economic condition of the ryot entirely depends upon the number of ploughs he employs. A ryot with one plough can cultivate 12 bighas on the average.

Holding 12 bighas, the whole being for tillage. His family consists ordinarily of five members—wife, himself, and three children.

Excluding 1 bigah, which is utilised in sowing vegetables, jute, &c. for his own use—

Eleven bighas produce
Dhan. Dal. Oil-seeds.
Mds. Mds. Mds.
- 66 + 5 + $1\frac{1}{2}$
Rs. Rs. Rs.
- 66 + $7\frac{1}{2}$ + 3 = Rs. 76½

The price of which is
Rs.
Rent - 18
Hired labour for weeding - 6
For reaping - 6 (one maund of paddy per every 11 maunds of the produce, if paid in kind).

	Rs.	A.	P.
Three warm cloth made kanthas for the winter	1	2	0
One pillow	0	2	0
Four pieces of cloth	3	0	0
One winter cloth	0	12	0
Ornaments worth	6	0	0
Stock of grains	0	0	0

Marriages are generally contracted by borrowed money.

He has sometimes a debt contracted for purchasing the bullock, seeds, and other materials necessary for cultivation, which is generally soon paid off.

About $\frac{2}{3}$ ths or less than half of the agriculturists are indebted.

CHAP. I. QN. 9.

NORTH-
WESTERN
PROVINCES
AND OUDH.Babu Raj
Kumar Sircar.

Mr. Skrine.

I do not hesitate to affirm that in ordinary years the condition of the peasantry in Lower Bengal proper might be envied by the English cottier. An average holding in that province would be rather less than seven acres. An agriculturist's family may be taken to consist of five souls. The value of his produce per annum may be estimated at not less than 15l., and were it not for his improvident habits the surplus would go far towards guaranteeing him from the incursions of famine.

The curse of the people is their indebtedness, i.e., the great majority being entirely in the hands of the middleman, wrongly termed a "money-lender," whose vernacular denomination is "mahajan" or "saikar."

About two years ago I instituted a series of careful inquiries on this point in the Nuddea District, and published the result in the then existing Government organ, "The Statistical Reporter" (November 1876). As the economic condition of the people of Nuddea closely resembles that of the greater portion of Upper India, Nuddea being admittedly a representative district, I venture to reproduce the result of these inquiries here.

I found that out of a population of 237,000, entirely agricultural, upwards of 75 per cent. were clients of

the mahajan. The average yearly indebtedness per client is not less than 7l., including a charge of 2l. 10s. as interest; the rates at which money or food grain is advanced are simply exorbitant, and the consequence* often is, that not only are all the ryot's savings swept into the "money-lenders" coffers, but the adverse balance continually increases, and the client is fortunate who is not eventually involved in ruin by being compelled to part with his plough, cattle, and homestead.

* Rates of interest demanded by mahajans in Bengal.

1.—On monetary loans for considerable amount covered by good and tangible securities	12 to 18 per cent.
2.—On ditto ditto for small amounts on good security	24 to 30 "
3.—On ditto ditto without security	37.5 "
4.—On advances without security of food grain for consumption	50 "
5.—On ditto ditto for seed	100 "

N.B.—12 per cent. is termed "Company's interest," inasmuch as it was the rate demanded by the East Indian Company for unliquidated commercial balances.

In the Durbhanga District, and generally throughout North Behar, the average ryot (i.e., the head of a family) holds between three and four acres of cultivated land, thus giving something less than three-quarters of an acre per head of the population. This is an important fact as far as the pressure of population on the soil is concerned; and the conclusion I deduce from it is that while in average good years

there is still a margin for saving, it is so small a margin that it is often swallowed up by the landlord's demands for arrears of rent, and the money-lender's demands for arrears of interest, not to speak of the ryot's own improvidence, when his purse is not empty, in matters of marriages, ceremonials, &c. An adverse year does not find him with much resources in store from the margin.

Mr. Mac-
Donnell.

CENTRAL PROVINCES.

CENTRAL
PROVINCES.

Mr. Nicholls.

I offer the following observations regarding the indebtedness of the people.

It is believed that during the past six years a considerable proportion of proprietors and cultivators of the privileged classes have, practically speaking, freed themselves from the burden of indebtedness, and that few, who 10 years ago were solvent, have retrograded, and where they have retrograded it has been due to individual carelessness or want of self-control. At the time of settlement, when sale or mortgage of lands first became possible, and the valuable gift of property and permanency of tenure enlarged the limits of credit, many of those who were indebted had to part with their lands, and a comparative few, thinking their credit inexhaustible, or not believing in the possibility of their lands being sold outright, for a time "plunged."

Those who have struggled and finally emerged from debt, form much of the backbone of the country, and now on the security they can offer, and very frequently without security, can obtain temporary loans at rates varying from 12 to 18 per cent.

In Sir R. Jenkins' report it is mentioned that formerly the rate of interest was higher than it is now (1827). Under Raghoji and Appa Sahib, the general rate on money lent on common security was three and four per cent. per mensem, and never less than two, on the best security, or pledges given to the full amount of the sum advanced, besides a deduction of two, three, and sometimes four per cent. from the amount of the loan.

At the time when he wrote the highest rate was two per cent. on good security, or pledges given. To patels and ryots the terms were commonly two per cent. a month, and two per cent. deducted from the original

sum; but to artizans and mechanics the rates were three or four per cent., or even more.

With the increased prosperity of the cultivators and the facilities they now have of taking their own produce into brisk markets where there are European or Bombay native agencies, the formerly almost universal custom of selling their crops before the harvest in advance is fast disappearing. This gradual lessening of the burden of indebtedness, has also been vastly accelerated by the adaptation of the times for paying rent and the Government revenue demand to the harvest times. Formerly the kists were paid four times a year, and generally the cultivator to pay his rent, and the Patel to pay his revenue, had four times a year to apply to the money-lender. Rents as well as revenue are now paid at a sufficient time after the two harvests to free the payers from this necessity.

My own inquiries and Mr. Collaco's knowledge lead me to believe that in the Nagpur and Wardha districts, among the privileged tenants, 5 per cent. are hopelessly involved, and would gladly give up their rights, if by so doing they could start afresh in life free from old debts and claims. Another 30 per cent. are, we consider, more or less deeply involved, but these will struggle, and have fair hopes of freeing themselves within the currency of the present settlement; another 30 per cent. are in debt to the extent of from one to five times the amount of the annual rental of their holdings; and the remaining 35 per cent. are either free or only in the books of the Saucars, because they rather like it than otherwise, thinking that they thus secure a ready support in time of

On the whole, among the tenantry there are many instances of crushing debt than among the body, excepting of course the malik malik and the

CHAP. I. Qn. 9.

CENTRAL
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Mr. Nicholls.

malguzars, who unite money or grain lending with their landholding occupations.

But it must be remembered that the Nagpur and Wardha districts are exceptionally prosperous. Throughout the Nerbudda Valley districts the cultivators are on the whole just as well off as those of Nagpur and Wardha, but there is vastly more indebtedness among the proprietors.

It has been seen that in Chhattisgarh the tenants were, practically speaking, entirely dependent on their landlords for advances, not only for seed grain, but for food grain. The same is almost the rule in Damoh. Bhandara is not very much better.

The rates at which loans are made for food grain are pretty nearly the same all over the Provinces, namely 25 per cent. But the rates for seed grain vary from 25 to 100 per cent. Thus in Nagpur in villages in which there is but little rice cultivation the rate for rice seed grain is 100 per cent., but in parts where rice is the staple it is only 25 per cent; linseed and urad 50 per cent.; wheat, tur, and others 25 per cent. Every cultivator is expected to preserve selected heads of joari for his own seed. If he has to borrow for this, he can return with selected seed, in which case he has to give an additional 25 per cent. by way of user, but if he returns ordinary grain he has to give double or 100 per cent. If cotton seed is lent, the borrower repays in cotton from $\frac{3}{8}$ to $\frac{1}{2}$ of a maund of uncleaned cotton for every maund of seed borrowed. This is equal to from 125 per cent. to 200 per cent. A well-to-do cultivator will never borrow cotton seed, but will purchase outright.

As regards the money-lenders, the village Marwaris, especially the later settlers, bear the worst name for trickery, hard dealing, keenness to take advantage of the ignorance of the cultivators, and to turn and twist our courts and laws to their own ends. The best among the lenders are those who are themselves pro-

prietors and who belong to the agricultural classes. These very seldom resort to our law courts.

The worst feature about the grain loans is that the debt is allowed to run on for a long time at compound interest until a time comes when the price of grain is high. Then all at once the creditor presses for settlement, and the grain debt is converted into a money debt at the enhanced current rates, and a bond or a decree is taken for money, which becomes the basis of further operations.

A cultivator who has once emancipated himself from debt will, above all things, shun borrowing grain, for it is immeasurably better for him to borrow cash at from 12 to 18 per cent. and purchase grain for his requirements.

At the lowest rate of user, a grain debt doubles itself in three years. Ordinarily compound interest would not run on cash loans, so the original loan would hardly be doubled in less than six years.

The surplus income of the cultivator is mostly converted into ornaments; but he is glad to lend on interest to his fellow-cultivators. Burying money is still very common, for the remembrance of the former insecurity of life from the Pindhari incursions and of property from the rapacity and extortions of the Bhonsla period, has not altogether passed away. Some say they hide their surplus cash from fear of thieves, others admit that poor relations and importunate religious beggars are still more dreaded. Very little, if any, diminution in the cost of marriage ceremonies has yet resulted, but in the northern districts villagers appear to be very curious to learn the customs and rates of expenditure in other parts of India, and greatly deplore their own inability to proportion such expenses to their individual means and condition of life.

As regards the indebtedness of the landholding classes, I give an exhaustive table, compiled with great care at the close of 1874.

District.	Total Number of Proprietary Heads of Ancestral Estates.	Number and Per-centage of Proprietary Heads of Ancestral Estates not Indebted.		Number and Per-centage of Proprietary Heads of Ancestral Estates in Debt.		Number and Per-centage of Proprietary Heads of Ancestral Estates Indebted in						Total Number of Separate Estates (Mehals) in which Proprietary Rights were conferred at the time of Settlement.	Number of Estates (Mehal) transferred to New Proprietors since the Settlement.	Per-centage of Mehals transferred to New Proprietors.
		Number.	Per-centage.	Number	Per-centage.	Class I. Indebted in Sums not more than One Year's Jama.		Class II. Indebted in Sums not exceeding Five Years' Jama.		Class II. Indebt. d in Sums exceeding Five Years' Jama.				
						Number.	Per-centage.	Number.	Per-centage.	Number.	Per-centage.			
Nagpur*	5,510	3,906	71·	1,604	29·	281	4·1	827	15·	546	9·9	2,170	249	11·5
Bhandara	1,255	903	72·	352	28·	87	7·	121	9·6	144	11·4	763	229	30·
Chanda	807	484	60·	323	40·	29	3·5	156	19·3	138	17·2	1,522	69	4·5
Wardha	1,887	1,448	76·7	439	23·3	58	3·	221	11·7	160	8·6	577	25	4·3
Balaghat	1,219	492	40·3	727	59·7	132	10·8	462	38·	133	10·9	386	73	19·
Total	10,678	7,232	67·7	3,445	32·3	537	5·1	1,787	16·8	1,121	10·5	5,418	645	12·
Jubbulpore	1,276	853	66·8	423	33·2	35	2·7	202	15·8	186	14·6	2,282	208	9·1
Saugor*	4,760	3,738	78·5	1,022	21·5	144	3·	480	10·	398	8·5	1,468	165	11·2
Damoh	1,063	767	72·1	298	27·9	25	2·4	134	12·6	139	13·	1,257	51	4·
Seoni	536	341	63·6	195	36·4	28	5·2	108	20·1	59	11·1	603	95	15·7
Mandla	763	616	80·7	147	19·3	78	10·2	43	5·6	26	3·5	527	56	10·6
Total	8,398	6,315	75·2	2,085	24·8	310	3·7	967	11·5	808	9·6	6,137	475	7·7
Hoshangabad	1,214	367	30·2	847	71·3	68	5·7	189	15·9	590	49·6	609	39	6·4
Narsinghpur	1,950	316	29·9	634	70·1	38	4·2	153	16·9	443	48·9	595	35	6·
Chhindwara	1,396	1,103	76·9	293	23·1	81	6·3	120	9·4	92	7·3	831	24	3·
Nimar	948	532	54·2	416	45·8	99	10·9	166	18·3	151	16·6	456	13	2·8
Betul	948	379	35·8	569	64·2	151	17·	193	21·7	225	25·4	534	134	25·
Total	5,456	2,697	46·5	2,759	53·5	437	8·5	821	15·9	1,501	29·1	3,025	245	8·1
Rajpur	1,842	1,065	57·8	777	42·2	243	13·2	452	24·5	82	4·5	3,309	259	7·8
Bilaspur	1,051	668	63·6	383	36·4	141	13·4	211	20·1	31	2·9	2,008	235	11·7
Sambalpur	438	357	81·6	81	18·4	32	7·3	36	8·2	13	2·9	513	15	2·9
Total	3,321	2,090	62·8	1,241	37·2	416	12·5	699	20·9	126	3·8	5,830	509	8·6
Grand total	27,863	18,335	65·8	9,530	34·2	1,700	6·1	4,274	15·3	3,556	12·8	20,410	1,874	9·1

* In these districts some sharers have been included with Malguzars, the families being undivided. Generally, however, Malguzars have alone been shown.

† 1,188 ancestral holders.

‡ 905 ancestral holders.

The solvency of the proprietary body was found to be considerably better than had been expected, but still there is much room for disappointment, seeing that at the commencement of this settlement the free gift of Government of proprietary rights, valued at

the lowest possible rates and strictly on commercial considerations, was worth three millions sterling, while, viewed as capital and as a solid and enduring basis for credit, its potential value was very far in excess of this amount.

Bapu Rao.—He considers that 15 years ago landholders and cultivators were deeply involved, but that they have gradually cleared off much of the debt. The money-lenders have realised large sums on account of old debts during the past two years. Civil suits for money lent are now less frequent, and the rate of interest, for respectable cultivators and landholders, has become easier. Sales and mortgages of land are on the decrease, whilst claims for possession of land, even of a few poles, are keenly contested. The improvement began from the time of the American war. The cotton of this district was sold at high rates. This was followed by the opening of the railway. For the last two years especially the high rates for agricultural produce and large exports by railway have done much towards the clearing off of old debts. Some landholders and cultivators through individual recklessness are, of course, on the high road to ruin, and still more have money debts bearing high interest; but on the whole the condition of the agricultural classes is much better than before.

It is believed that a large amount of gold has been absorbed in the district by villagers during the past two years. Many particularly wealthy men could be named whose riches are of comparatively recent date. A late honorary magistrate is known to have died indebted; but it is said that he allowed his debt to stand to make people not notice that he had hoarded about half a lac of rupees worth of gold. The late malguzar was on the brink of ruin ten years ago. Although he died in debt to the extent of a few thousand rupees in consequence of his lavish charity, yet he left grain enough to cover most of this in a single payment. Rich cultivators, some of them belonging to the lowest caste, are often met with, but these are individual cases. As a class cultivators have advanced, because crops have been good and rates exceptionally high. If the worst were to happen for two succeeding years, the majority of cultivators would be again in difficulty. They will have to borrow money at high interest. The question arises how is it that they cannot stand two bad seasons. Except our urban population, we had but village communities, and that the institution, though not well defined, still lingers on, is a fact that can be discerned in every village. Under this system the actual cultivator had limited duties and responsibilities. They tilled the land, but the village headman supplied cattle, seed grain, labour for weeding, food grains, and loans for marriages. He made such improvements as he thought best on the village lands. The actual cultivator never rose beyond the position of a landed serf. Recently the actual cultivators have obtained proprietary or occupancy rights, but at the same time they have lost their old claim on the feudal superior; hence wherever the recipients were capable by intelligence, means, and pluck to carry on their agricultural affairs without the aid of others they have thriven remarkably well. But such was not the condition of the majority of the recipients of the boon. They had no capital, education, or pluck, and from time immemorial were habituated to dependence on their landlord for everything. When they were made almost independent of the landlord for agricultural purposes, the good feeling between the classes grew colder, and often feelings of jealousy arose. A few years before occupancy rights were given by Government, a foreign money-lender, the Marwari, had appeared on the scene, and the needy cultivators flew to him for money and grain advances, and an indigenous class of local usurers of the Marwari type also sprang up. It is needless to detail the results of such a state of things. The worst feature in their operations,—which brought almost

hopeless ruin to the cultivators,—was the system of selling the coming crops at certain rates fixed at random, not for cash but on account of old debts. As a rule, the cultivators were unable to execute their agreements, or were not punctual in delivery, and had to pay damages, often under decrees of court, at rates often involving the return of several fold what they received. They have since to a great extent recovered, but the causes of their recovery are not permanent. One or two bad seasons would see many reduced nearly to their former condition. They are not yet fitted by education, by the possession of capital, and by pluck to stand alone. The cultivator has still ingrained in his nature habitual dependence on others for capital and other help. He is still credulous and superstitious, and even now cannot understand the necessity of improved modes of cultivation. He still uses the refuse of his farmyard for fuel instead of utilising it as manure. And in our law courts, in comparison with his creditor, he is helpless. If his Malguzar be rich and well disposed towards him, he would still have a chance of tiding over two bad years; but if his Malguzar be involved like himself or be non-resident, or has no sympathies with his ryots, then he cannot help going to ruin. Villages can be pointed out where the cultivators are prosperous, not so much because the seasons have been good and prices high, but because the Malguzar is himself well-to-do, and watches over the interests of his ryots in every respect. On the other hand, villages close to Wardha can now be shown, where the Malguzars themselves being in difficulties, money-lenders have obtained a strong hold on the ryots, or where the Malguzars and ryots not being on good terms, the ryots have to surmount all sort of vexations. But to provide the ideal Malguzar for every village is almost impossible, and therefore the ryots must learn habits of independence. The worst enemy of the ryot is the money-lender, and the land revenue assessment, bad seasons, extravagance and idleness do not contribute to embarrass them so much as the system of selling coming crops in advance for money due, not for principal alone, but often mainly for interest. As a rule, the cultivator is patient, industrious, and frugal. He and the members of his family work on during all seasons of the year in or for their fields, and in return they get sufficient produce. They seldom eat meat. Salt, red-pepper (chillies), onions, garlic, turmeric, and oil are their condiments; and a few seers of gur suffices for holidays. As a rule they are temperate. Two dhoties and an occasional pagri and dopatta suffice for each male member of the family, and two saris and four cholics complete the wardrobe of every female member.

Example 1.—A typical instance is Narayan Teli, an occupancy ryot, free of debt, holding 44 acres, of which four are fallow. He has seven grown up persons in his family, three males and four females. He has 15 head of cattle, of which six are bullocks. Last year his produce was worth Rs. 225. The women of his family work on his fields, and during spare times are employed as labourers for other people, earning about Rs. 30. He cultivates about 21 acres in another village, which last year produced crops worth Rs. 90, thus his gross income was Rs. 345.

His expenditure was:—

	RS.	A.	P.
*Joar at 6½ seers per diem = 10½ Khandies	84	0	0
*Wheat - - - - - 1 do.	12	0	0
*Pulses - - - - - 2½ do.	36	0	0
Gur, 22 seers - - - - -	5	0	0

* Produce of his own fields, consumed as food at home.

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CENTRAL PROVINCES.	Salt	-	-	-	2	12 0
	Oil	-	-	-	18	0 0
	Chillies	-	-	-	6	0 0
	Onions, garlic, turmeric, &c.	-	-	-	12	0 0
Mr. Nicholls.	Total	-	-	-	175	12 0
Bhorgao Rao.						
Mr. Imrie.	Clothing—				RS.	A. P.
	8 saris	-	-	-	16	0 0
	6 dhoties	-	-	-	6	0 0
	3 pagris	-	-	-	5	0 0
	3 blankets	-	-	-	4	8 0
	Chollies	-	-	-	0	12 0
	6 pairs of shoes	-	-	-	4	0 0
	3 dopattas	-	-	-	3	0 0
	Weeding expenses exclusive of the labour of his family	-	-	-	20	0 0
	Rent	-	-	-	51	0 0
	Total	-	-	-	286	0 0

This cultivator is the head of a prosperous family. He has two brothers as strong as himself. He sold the following produce, which is included in the amount of his income shown above:—

Cotton, worth	-	-	-	Rs. 57
Linseed	-	-	-	9
Kurbi	-	-	-	5
Grass	-	-	-	8
Total	-	-	-	79

There was a surplus income of Rs. 60.

Example 2.—Mannu, an absolute occupancy ryot, has 22½ acres, and is a tenant-at-will for three acres. He is free of debt. In his family of six members, four are grown-up people. He has two plough bullocks and seven head of other cattle. His crop was worth Rs. 178. His expenditure was:—

				RS.	A.	P.
*Joar, 5 seers a day = $7\frac{1}{3}$	Khandies	-	-	56	0	0
*Wheat, 160 seers = $\frac{1}{2}$	do.	-	-	6	0	0
*Pulses - - - $1\frac{1}{2}$	do.	-	-	18	0	0
Salt - - - - -	-	-	-	3	6	0
Oil - - - - -	-	-	-	12	0	0
Onions, &c. - - -	-	-	-	9	0	0
Gúr - - - - -	-	-	-	5	0	0
Total - - - - -	-	-	-	109	6	0

* Grown in his own field, consumed as food at home.

Clothing—					RS.	A.	P.
2 saris	-	-	-	-	4	0	0
3 pagris	-	-	-	-	4	0	0
8 dhoties	-	-	-	-	7	0	0
4 blankets	-	-	-	-	3	0	0
Chollies	-	-	-	-	2	0	0
Wages of boy servant	-	-	-	-	4	12	0
Weeding expenses	-	-	-	-	5	0	0
Rent	-	-	-	-	26	0	0
Total	-	-	-	-	165	2	0

There was a surplus of Rs. 12 14 0.

Mannu sold cotton worth Rs. 38, linseed worth Rs. 5, and mung worth Rs. 3.

The houses of these ryots are mere huts with one room and a verandah.

There are one or two cattle-sheds close to the dwelling houses. Grain is kept above ground in basket-work stores, thatched on the top. The cost of such a house is under Rs. 25. Every ryot sells produce first to pay rent and pressing debts. Generally there does not remain much to be stored. Cotton and linseed are all sold, and these are the crops which enable a cultivator to lay by some cash, which is generally buried for safety as a provision against bad times. Few cultivators lend money or enter into trade. Expenditure on marriages or for purchase of cattle occur now and then. A marriage costs from Rs. 75 to Rs. 125, and it is mainly for this that recourse is had to the money-lender. If he had only to pay simple interest at 12 per cent. he could often manage to pay off his debt in good seasons; but what

keeps him struggling on are the devices of the money-lender, which hardly allow a debtor, when once involved, to free himself.

Note.—The cereals consumed by these two cultivators appear to be greatly over-stated. The probable surplus I calculate at Rs. 50 and that of Narrain at Rs. 125.

Bhorgao Rao.—A cultivator who once gets into debt finds great difficulty in getting out of it. When grain is borrowed it has to be repaid with 25 per cent. in addition some six or seven months after. Failure to deliver on the stipulated date carries with it a penalty of, say, from 50 to 100 per cent., and the cultivator, notwithstanding all his exertions, gets deeper and deeper into debt. They also frequently borrow and give agreements to sell their produce to the lender at very low rates, and in case of failure they are bound to pay the price at double these rates. A case was noticed, a few days ago, in which a Malguzar had received 11 manis five years previously, and had executed a deed for 51 manis. An inquiry into the indebtedness of the Malguzars of this district showed that out of 950 men, 634 were in debt; of the latter, six per cent. had debts equal to one year's jama; 24 per cent. of more than one year's and less than five years' jama; 70 per cent. of more than five years' jama. The highest amount of the debt was 30 times the jama of the village. As regards cultivators, the per-centage of debtors is estimated at from 25 to 30 per cent., and their debts do not run so high, and exceed five years' rent in a very few cases.

Mr. Imrie.—The conclusion arrived at by Mr. Imrie and the Malguzars whom he has consulted is that 80 per cent. of the cultivators of the district are believed to be in debt, between 20 and 30 per cent. hopelessly so. But it must not be supposed that those who are burdened with debt greatly exceeding their annual income are therefore in a wretched state. No depth of debt could make a cultivator live more cheaply than the run of his fellows. His habits remain the same; he spends little in luxuries at any time; his house and fields remain as neat or neglected as it suited the task of their owner in better times. His expenditure at marriages and fairs must be curtailed, and if nothing can help him, at last his fields must be taken away.

Whether he be in debt or not, the economic condition of the tenant remains pretty nearly unaltered. He has a house of mud walls with a tiled roof. It costs from 15 to 20 rupees to build, and needs petty repairs each year as the rains set in. His household may consist of two or three women, and say a couple of children, unable to do any paying work. These do all the household work. At certain seasons hired labour must be employed. This is during the ploughing, sowing, and weeding times, and at harvest, and the time for cutting grass. The growth of the kans grass must be carefully checked.

Hired labourers at these times can earn enough to feed their families. Perhaps a third, sometimes a half, of these come from Bundelkand and the hilly parts of Saugor, the rest are villagers. They are mostly paid in kind, and what is given is not counted in reckoning the gains of the season. It is from what is shown on his threshing-floor that the produce per acre is deduced by the official and the harvest returns by the cultivator. It is still more difficult to calculate his other expenses. Little rice or sugar is produced. These he must purchase at from 5 to 15 rupees, and salt for his family and cattle cost about five rupees a year. He smokes tobacco if he can get it. Fuel is never a heavy item.

The women of the family likely come provided with a many years' store of clothing on their wedding, but even these may have been got through or succumbed to white ants. For the coarser cotton clothing, it is

the custom where cotton is grown to have, at a small charge, so many seers worked up in the village, if not in the house. Then there are little contributions to the village temple, to the patwarri and the kotwal, to the baid and the midwife, the barber and the cobbler, the fisherman and the scavenger, the idiot and hunchback, and the yogi and byragi, whom the cessation of the rains has let loose from the city. Then, too, there is the great fair at Rangir or Garhakota, and the annual pilgrimage to the Nerbudda,* if the women of the family have any influence. The offering may be only a handful of grain, but the long journey "of many axes" would be thought an extravagant one in any other country. At least a quarter of the population of the district attend each of these annual fairs.

Mr. Imrie remarks that it would be most difficult to give exactly the income and expenditure of a cultivator who keeps no reckoning of the many small payments he makes and expenses he may incur or of the days for which he gives wages. He sows what he thinks will be the best crop, and he works as the weather allows him, and his expenditure must vary with the weather as his crops do. It never enters his imagination that a poor cotton crop may pay him better than a good crop of joar; or, though one crop sown with another † may shield from blight or frost in January, it may be better policy to keep them apart. The weather is his dictator, and not any thought of a future market price.

Cotton is becoming the most important kharif crop, and a failure of the joar and rice is becoming of less importance.

In conclusion, Mr. Imrie observes that though he considers 80 per cent. of the cultivators to be in debt, and something less than 30 per cent. to an extent exceeding their yearly income, he would put the average indebtedness at less than half the yearly gross returns of their lands. The general indebtedness may be on the increase, but not rapidly. While the cultivators hold their fields, they live in the usual simple way, supplied by their malguzars with grain when their own store is exhausted. A season of drought increases their debts and reduces many to the condition of labourers, and their indebtedness keeps them from expending money in clothes and jewels. But generally their condition is far from wretched, and they are as apathetically contented as need be.

Mr. Imrie has given the result of his inquiry in the cases of 19 ryots, and has taken great trouble in the matter; but it seems of no use for me to tabulate these results, as the details of returns of income and expenditure are not reliable or are not clear.

Regarding the debts owed by these men the following particulars are of some value:—

- owes Rs. 250 to a creditor, and pays interest at 24 per cent. The debt was contracted some 10 or 12 years ago on account of marriage expenses. It has varied in amount from Rs. 100 to 400.
- borrowed Rs. 50, two years ago, to meet the expense of a marriage. He has since paid it off.
- owes Rs. 100 or Rs. 125 bearing interest at 24 per cent. Last year the debt was only Rs. 75, and is due to a bad harvest.
- some six or seven years ago borrowed Rs. 40 for marriage expenses. It has now reached Rs. 150, bearing interest at 24 per cent.
- ows Rs. 100 to the lumbarbars of his village; the cause of incurring the debt is unknown.

* I have frequently noticed the marked preponderance of the people from Saugor, Damoh, Jubbulpore, and Narsinghpur, passing through Bilaspur to or from a pilgrimage to Jagernath at Pooree.

† Mixed crops on the same land.

‡ The people in Damoh, and probably in Saugor, are somewhat extravagant in the matter of dress. In Damoh it seems to be a proverb that the Lodhi, one of the most numerous castes, "will put on his back what ought to be put in his belly."

- owes Rs. 200 on a very old account, increased by two marriages.
- owing to marriage expenses, owes Rs. 100.
- owes Rs. 40, borrowed for the purchase of bullocks.
- owes Rs. 200 on an old account, which is being cleared off.
- owes Rs. 12, borrowed on account of a bad harvest.
- owing to two bad harvests, had to borrow Rs. 350. One man is putting by his savings to provide for the marriage of his daughters.
- One employs his savings by making petty loans. Others are increasing their live-stock.

Wasadeo Ballal Kher takes the case of a man owning four plough bullocks, being a holder of land on privileged tenure and as tenant-at-will in equal quantities, having a wife and three children, besides two relations or dependents. He would farm about 15 acres. The two pairs of bullocks are worked alternately and grazed on or near the fields. For two months or more they are used in bringing fuel, timber, grass, and fencing materials from the jungles. They have to trample out the corn on the threshing floor. They rest about a month in the year. Besides grass, they have the chaff, about 100 seers of teora and about two rupees' worth of salt. They should last in vigour five years. A pair cost from 35 to 40 rupees. A well-to-do cultivator would have half a dozen cows, enough to give a new pair of bullocks every second year. They would pay for their keep without trenching on the produce of his fields. The typical cultivator employs hired labour only at harvest time, which is remunerated in kind. So many sheaves become the right of the labourer. These are threshed on the employer's threshing floor, and he is bound to see that each man gets not less grain than two seers of grain a day. If the weather be unsettled he may have to offer so much as four seers wage.

Mr. Wasadeo Bullal Kher gives the following out-turn factors, which are probably in most cases very far below the mark:—

Wheat	-	3½ fold.	Urad	-
Teora	-		Jowari	-
Masur	-		Kodo	-
Batera	-		Kutki	-
Linseed	-	4 fold.	Sama	-
Rice	-			
Cotton	-			
Gram	-			

But on account of the husks of rice, kodo, kutki, and sama, one-half of this will represent the food return. Apparently he reckons the food out-turn of 15 acres at 24 khandis of 140 seers each. This again seems to me under-estimated. He raises his own tobacco, chillies, and vegetables, of which crops also he sells a part.

For his own consumption he gives over a portion of the oil seeds he raises to the oil-presser. If the Teli keeps the oil cake he charges only ¼ anna on each seer of oil. If the cultivator takes back the oil cake he charges ½ anna per seer.

The 24 khandis of grain are thus disposed of:—

	Khandis.
Seed	- 6
Kotwal, smith, carpenter, barber, washerman each	- 1
28 seers of grain	- 9
Food of seven persons at ½ seer a day	- 9
Total	- 16

To the 8 khandis surplus, at Rs. 5 a khandi = Rs. 40
Add Rs. 5 for cotton sold, Rs. 5 for vegetables, &c., 10

Total - 50

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CENTRAL PROVINCES.	EXPENDITURE.	R. a. p.	
		R.	a. p.
Mr. Nicholls.	Rent at Re. 1 an acre for occupancy tenure land, and 1½ for other land	16	12 0
	Cesses and Patwaris fees	1	4 0
	Gur	2	0 0
	Salt	2	0 0
	Spices, &c.	5	9 0
	Clothing at Rs. 3 8 0 for each adult and Re. 1 each child	17	0 0
	Total	42	0 0

Leaving a balance of Rs. 8.

Now and then a pair of bullocks past their prime come to be sold.

It seems that Wasadeo Bullall Kher, like Mr. Imrie, regards the grain saved after all expenses of

cultivation and harvesting have been deducted as income. The balance saved, if it is not devoted to the liquidation of debt, is turned into ornaments. The home consumption of grain is augmented by fruits, roots, and other minor forest produce, or raised in the "bári." "But the saving of cereals may be left out of the account as a set-off against the additional expenditure of occasional festivals and dinner parties "on a small scale." For meeting the costs of marriage ceremonies or the deficiencies of bad years, the ryot must trust to the more bountiful harvests of exceptional years. If he wishes to increase his scale of operations his first idea is to take more land under cultivation; secondly, to employ more labour; lastly, to raise some special crop, such as sugar-cane, which requires extra care besides the additional cost of irrigation.

BERAR.

nothing of accounts, and are entirely at the mercy of the saucars. It is calculated that the saucars, with high rates of interest and fraudulent accounts, double in two years the capital employed. There is no doubt that these men are necessary to the ryots, who, indeed, could not do without them; but the present indebted and helpless condition of the ryots will continue until they are protected by usury laws.

It is difficult to illustrate what has been recorded by examples, because the ryots keep no accounts of income and expenditure or of their dealings with the saucar, who, on his part, would not disclose the actual state of affairs. About one-half of the agriculturists are believed to be in debt.

Bombay Presidencies by famine, and that of cotton since the failure of the American crops, raised the value of the land, which before these events had no price, for it was frequently resigned by the cultivator, and a number of fields in each village remained uncultivated. Never since the first deficiency of cotton in America has the price of that article in this part of India been what it was before, viz., Rs. 8 per bale. It has been so high as Rs. 125, and not lower than Rs. 20. The demand for the land has increased to such an extent that every waste field has been taken up. Part of the large block considered as unarable by the Survey Department has also been cultivated, and, if Government had permitted, the land set aside for free pasturage would have been taken up.

The family of the agriculturist is commonly undivided, and consists of his parents, brothers, his and their wives and children, &c. The members are never a burden to him, and contribute by their labour to the cost of their maintenance; they work in their own fields, and for hire in the fields of others. Females who do not appear in public, and who are unfit for work in the field from old age, &c. gin, or spin cotton at home.

Notwithstanding his indolence and want of exertion, as I shall show hereafter, the agriculturist, by the fertility of the soil, is able to raise sufficient amount of food-grain and other produce, as detailed separately in each case in the statement, on an average in a year for his family consumption, and to buy with a part of it things which his land does not produce, and which are necessary. What has been shown in the statement is not the only kinds of produce the cultivator raises: hemp, safflower, oil-seeds of different varieties and grain are also produced. The amount of revenue he pays varies with the quantity and quality of the land.

The expenses he incurs in hired labour are somewhat more than what it would be had he been industrious. He has very little active spirit in him, and

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Sri Krishna Narhar.

he is more inclined to rest in comfort than to work. He would never set out to work in the field before 11 a.m., and the members of his family and the labourers follow his example. They reach the field a little before mid-day, and leave it so early as to be able to return to their homes before dusk; the time therefore of the labour is limited with reference to the distance of the field from the village. Though the work is done for half a day, the whole day's wages are claimed and paid. The argument is that this is the custom in Berar.

If the agriculturist, after the example of his brother in Khandesh, would attend the field with the members of his family in proper time, a great reduction would be effected in the amount of expenses. He has become so indolent, specially since the lucky days of cotton, that he often employs a labourer in his stead and stays himself at home an unproductive consumer.

The expenses in hired labour shown in the statement are only those which he incurs in the shape of money; those he incurs in kind cannot be shown, for he takes into account the balance of the produce which he carries home after paying off the labourers, the village servants, the smith, and the carpenter, &c., who render him service during the year without charging for it or a portion of it, and which only has been entered in the statement.

The labourer employed annually is both directly about the things produced and in operation preparatory to their production. The natural advantage, the peculiarly good quality of the land here does not require the same preparatory operations every year. The ploughing, which is the most expensive of all the processes, is necessary only once in 12 or, in some instances, in 20 years. Harrowing is all that is essential annually to smooth the land. The agriculturist is not always in the position of carrying on this easy operation with his own establishment, and often has recourse to hired labour. In many villages the practice of remunerating labour with labour is obtained, and he works in the field of him who has worked in his field. Four men and three pairs of bullocks are requisite for a plough here, unlike the custom in Berar, Balaghat, Buldana, and Basim, where one man drives three pairs of bullocks.

Bullocks here are trained both for cart and plough, and are more governable, consequent on the nose-string, than the bullocks in Balaghat, where they are only trained for the plough and are free from the nose-string.

The agriculturist's annual expenses in purchases of necessities which he cannot produce on his land, though moderate, are greater than those of his brother in Khandesh. His ordinary food is simple: joar bread, tur, mung, urad, or masur dall, and a vegetable are all that he receives daily for his dinner. His breakfast is bread, which he eats with onion, garlic, salt, chilly, oil, or chatni. His food differs on holidays, on which occasions he eats wheat bread, tur, dall, ghee, sugar, and vegetable, &c.

His dress is respectable: turban, dhoti or wearing cloth, angocha or body cloth, angarkha or coat, and shoes, are his necessary apparel. Angarkha, however, is worn on holidays, or on occasions of appearing in society, in court, &c. Berar is much improved in point of dress as compared with Khandesh, Poona, Sholapur, and Pandharpur, &c., where the set of dress of an agriculturist consists of a "lungoti" and a blanket; the former is not even known here to the boys or the lowest Hindu—the Dhed.

He bathes every day, and is superstitious. He does not drink, though drinking does not excommunicate him from caste or society, and eats flesh on certain occasions, which are not more than two or three in the year. He is fond of tobacco, which he masticates with betel, and carries about him a bag divided into several portions, each of which contains different stuff of which the betel is composed.

Physically he is neither so strong nor so tall as his brother in Khandesh. He is of middle stature, brown complexion, dull and slow in his work, and appears in

consequence of his peculiarity of dress more like a mahajan than a cultivator. One who has visited Berar for the first time from Khandesh, would take him for the one, rather than for the other.

The kind of house he lives in has mud walls covered with grass, called chupper, or a flat roof, called dhaba. It is limited in space, and is seldom divided into one or two rooms. It is kept clean, and has always one or two out-houses used as cattle sheds. The arrangement within is not at all such as would please a visitor. One would see nothing but litter of clothes and utensils, &c., about the whole space.

He possesses the quantity of cattle or other live stock according as the village he lives in has or has not the advantages of the hills upon which the grass and the fuel grow. He whose village is at the foot of the ghaut generally possesses a larger number of them than he who lives at a distance. When he has no field work and his pressed for money, he employs himself in bringing in fuel upon his cart for sale, and during the non-working season keeps his cattle upon the hills, where grass is in abundance and accessible at a nominal price. He also carries the produce of his land, and that of others, for hire on his cart to the nearest market. He is very fond of going in a cart even if the village he has to visit is close.

Buffaloes and cows, whose number increases annually, yield their owner milk. The females are expert in the management of the dairy, and amply supply the nearest weekly bazaar with butter.

The other property the agriculturist possesses consists of carts, gold and silver ornaments. The cart is neither well fitted for conveying people nor property. Its construction is singularly of the worst kind. The wheels are low and have narrow tires. The people have begun to distinguish the difference between Berar and Khandesh carts, which are better constructed and better suited for both the purposes, and are importing them into Berar.

Gold ornaments are composed of nose-ring and ear-rings for females, finger-rings and ear-ring for males. Silver ornaments consist of necklace, bracelets, armlets, and ankle rings for the females, and a bangle and waist-band for the males.

The agriculturist's stock of grain is generally sufficiently large to subsist him and his family until he reaps his harvest. This stock is not, however, in every instance the result of saving, but of withholding repayment of a part of his debts.

The instances of accumulation of surplus income or of lending money are very few. The agriculturist spends on marriage and other ceremonies not only the surplus income, but all that he could obtain on credit. On ceremonies preliminary to the marriage he spends much more now than what he used to some years ago for the marriage itself.

His debts vary according to his circumstances, which are too many to be enumerated: his large family, the natural reverses, deaths, marriages, &c. They are, however, not often beyond his means of liquidation if the creditor has patience and allows him time to do so by instalments.

The debts are commonly due to his improvidence, and the unfair dealing with him of his creditor. The unfavourable circumstances in America and the crisis in India which raised the prices of the produce of the land, improved his condition, but not his intelligence and foresight. With improved condition, he coveted the comfort and luxury of the higher classes of the people whose manners and customs he imitated during marriages, and in place of ten spent a hundred. Being unaccustomed to purchase articles of luxury, the dealers in them took advantage of his ignorance and sold them to him for prices twice or three times the amount of their value. He acquired an emulative spirit, and desired to gain superiority over others in the matter of expenditure in marriages. He thus exhausted all his resources, and became a dependent upon the money-lender who became his capitalist, without whose assistance he could do nothing.

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BERAR.

Sri Krishna
Narhar.

The wholesale cultivation of the land and the high prices of the produce raised the prices of labour, and the demand for money the rate of interest, and, what amounts to cheating, introduced a practice of paying less consideration than that stated in the bond. For every hundred in the bond the consideration has been Rs. 82 or 85, or less. The circumstances in America have changed and the price of cotton is reduced, but the ostentatious habit of the cultivator and the usurious practice of the money-lender remained unchanged, and are still continued. The pressing need which obliged the agriculturist to give his passive acquiescence to the usury practised upon him encouraged the money-lender to advance a step further. He untimely demands liquidation of his debts, and compels the debtor to sell to him the produce of his land before it is raised at a low rate, to be delivered at the harvest; and if he fails to fulfil the contract debits him with the prices at the rates, which are always high, prevalent in the market. He then receives a bond for the whole amount, or the debtor's acknowledgment of the accounts in his books, by causing him to affix a stamp thereto, and

thus secures his interest against the contention of the debtor.

The combination of all these facts, which have been originated by the improvidence of the agriculturist, does not place it in his power to escape from the money-lender's grasp at his will, if he once falls into it. The result of this is that the original cultivator of the soil is day by day losing his hold, and his place is being taken up by the Marwadi and the other classes of money-lenders. Government, being alive to the interest of the agriculturist, has withdrawn the power from the civil court of sanctioning the sale of the land in execution of decrees, and has divided it between itself and the Commissioner, according as the property is ancestral or self-acquired respectively, and I often see that the sanction for sale has been refused by these authorities; but this measure has not proved a success, for by private arrangement the land is being transferred from the owner to the money-lender.

I believe 75 per cent. of the agriculturists of this district to be in debt, and that their average indebtedness is four times the average of their yearly income.

Mr. W. B.
Jones.

EXTRACT from the REVENUE REPORT for 1877-78.

Economic position of the Agricultural Classes, and transfers of Agricultural Holdings.

The first subject of this chapter is one regarding which there is happily at present but little necessity to say much. The Berar cultivator is probably as well-to-do as any man of his class in this part of India, and, thanks to our almost perfect system of tenure and settlement, does not appear to go down in the world as cultivation advances and the value of land increases, as all but the privileged members of his class are apt to do where the *malguzari* system prevails.

The Deputy Commissioner, Bassim, remarks that the extent of land available to cultivators enables them at present to set even saucars at defiance; for if pressed too much, they can move off to other villages and saucars; but he apprehends that, as cultivation increases, the cultivator will be more and more at the mercy of the banker. There is no doubt something in what Captain Bullock states; but, as far as I am aware, there is no proof that what he apprehends is actually happening. I have never heard that the cultivators of Akola, where cultivation has almost reached its utmost limit, are worse off than men of this class elsewhere; and statement L. certainly lends no countenance to Captain Bullock's theory. The figures for Akola are somewhat large; but the district and the number of occupied fields and the value of land are high also.

It is, in fact, one of the distinguishing merits of the Bombay system of land tenure and settlement that under it the cultivator is far less *ad scriptus glebe* than he is under the *malguzari* system.

When circumstances turn him out of one village, the world is all before him where to choose, and he has not to make terms with any proprietary body, or conciliate any powerful landowner. The State offers him land in all its districts; and there can be no doubt that the facilities which a Berar cultivator has for transferring himself where he pleases is an important element in his prosperity, and a great economical advantage besides.

Comparing Berar with the Nagpur province, I have remarked that *pátels* here are much less frequently the village bankers than *malguzars* are there. The fact, if true, has its unfavourable as well as its favourable aspects; but it is no doubt the result of the difference in the system of tenure in the two Provinces. The *pátel* here is less impelled towards banking than the *malguzar* there, because his office is not permanent in his own family, and he cannot aid his banking operations by the despotic power which a *malguzar*

wields over his tenants. It has also to be admitted that the *patel* is a less wealthy person than the *malguzar*, and is therefore less able to lend.

It has already been stated in Chapter I. of this report that the fine cotton crop, and generally fair *joar* crop, of the present year, have, combined with high prices, brought a great deal of money into the Province and assisted (as is believed) in reducing agricultural indebtedness. The statement now submitted confirms this favourable view. Considering the number of decrees constantly being given and now in force, the number of cases in which the sale of land is applied for is surprisingly few, and the number in which it was actually sold perfectly insignificant.

I have even come to doubt whether the restrictions which we place on the sale of land are beneficial. When in the Central Provinces I advocated such restrictions, and were I there now should do so again. But in Berar I find all the arguments which I have been in the habit of urging in the Central Provinces in favour of restriction cut from under my feet. There is no political danger here in unrestricted sale, and much economic advantage. A *malguzar* in the Central Provinces who has lost his village is ruined, but the Berar cultivator who loses his field can start again in another as soon as he pleases. A discretionary power which, like that in question, does not (at least such is my experience) admit of being exercised on well-known and recognised principles, is by that very fact condemned. If the refusal to sell were of much use to the judgment debtor there would be some excuse for refusing, but we know that even this justification is wanting and that the judgment creditor can, notwithstanding refusal, make the field quite valueless to the judgment debtor. My view, then, is that, while the uncertainty which the discretionary power produces tends to diminish the credit of every *kumbi* in Berar, and is therefore a grave economic evil, the cases in which the power can be exercised with fairness are very few, and those in which it can be exercised with any advantage to the judgment debtor still fewer; and that its exercise should now be limited to a few clearly-defined and selected cases. The matter would, of course, need to be thoroughly discussed; but some Deputy Commissioners I know think as I do. The principle I now go on is to sanction every application that comes before me, unless there are clear reasons for refusing to sanction.

The prices realised at sales by decree of court were, considering that in numerous cases there were liens on the land, quite as good as I should have expected. The smallness of the prices realised in sales for arrears of revenue has been already explained.

If the Berar agriculturist's condition was to be inferred from the income he ostensibly derives in comparison with the outlay he is apparently put to, the conclusion would be that he was literally rolling in accumulated wealth hoarded with the most miserly intent, for his person and belongings, his habitation and his wants to superficial view betoken most miserably limited expenditure. But if inquiry were directed beyond the domestic thresholds of these people, it would soon be discovered that very far from effecting hidden hoards of gain they really live in the most precarious manner, that their income in most cases meets, and barely meets, their necessities, and while of them a favoured few may have enough and to spare, their number is more than counterbalanced by those who really have not a sufficiency to meet their most ordinary wants, and whose state is practically an endless bondage of indebtedness.

Before proceeding further, a point of obvious inquiry merits notice. It has to be admitted that, judged by the difference of prices, the income of the Berar agriculturist should have immensely increased over what it was 20 years ago. That he has not undergone a corresponding improvement in his condition is a fact sufficiently apparent to need explanation, and this explanation is contained in the following causes:—

(1.) Although the rates at which field produce is marketably disposable are now more favourable in the ratio of 1 to 5 than they were 20 years back, the producing capacity of land in Berar has been diminished in an almost equal proportion. The rapid succession on which crop succeeds crop in the present day was not known in the bygone period in reference, and field land has therefore undergone an exhaustion of its fertile elements which the cultivator, in his constant need of means and his consequent avarice, has not been enabled to supply by the agricultural expedients which would have been possible of application were the soil given a period of rest and recuperation. Such periods of rest were of frequent intervals when the land was not surveyed nor measured, and portions of it set apart to cultivators, who used to take for their use as much land as they pleased for a nominal rent, thus enabling themselves to allow rest alternate to portions of the land; whereas now it is different. All land has been surveyed, measured, and duly apportioned between cultivators, who cannot now take much more than is allotted to them, and try to realize out of it as much crop as they can to defray Government demand, as also to satisfy their avarice, which has considerably increased on account of high prices.

(2.) The cultivator is now put to expenses which in former times he did not know. His pecuniary wants are so pressing that often the whole produce of a crop is disposed of by him without provision being made from it for his own subsistence, and very often without his even reserving from it a sufficiency of seed grain for future sowing. He now pays more for his cattle than he did of yore, and he can no longer fell a tree from any place he likes to provide him with a shaft for his plough, or a yoke for his oxen. He has now practically to expend coin where before he needed only to labour, and the grass with which he annually thatches his hut has now to be bought, and not merely cut and carried as it used to be.

(3.) The manure the cultivator now uses has to be paid for by him both practically and dearly. The days when large areas of waste lands adjoined villages in Berar and afforded free and abundant pasture to village cattle have now departed, and in the present time the cultivator has to either pay the possessors of pasture lands for the privilege of grazing his cattle on them or to set apart a portion of his own land for the purpose—an alternative which represents loss on his part to the extent of the value of the crops that might have been raised on such land and the amount of revenue that has to be paid for it all the same. Thus the difficulties attending the keeping and rearing of large herds of cattle by the Berar agriculturist have increased so as to limit the number of head

he now possesses to the actual requirements of tillage, and in this way the supply of the only description of manure used in Berar has been, in the cases of the mass of cultivators, so reduced as to be altogether insufficient to meet the demands of the soil for nourishment.

The above are material causes which have tended to impoverish the Berar cultivator by reducing his income. There are, besides, other causes of habit and condition which co-operate with these in keeping him in a state, as regards worldly means, not much, if at all, in advance of the original condition of not only himself but his forefathers. In a ready market for his produce he has acquired facilities for coming by ready money at frequent intervals, the possession of which has tempted him towards luxuries and extravagances which his fathers never dreamed of. The increase of trade and commercial prosperity has brought the agriculturist in contact with people whose ways in some respects he has been apt to imitate at the expense of his purse. He has acquired habits of laziness and indolence which keep him at home in a Bombay or Manchester "dhoty," when his father would have been out in his fields tending his crops, scantily clad, but with this further difference that while the father's *jarness* were well filled the son's are empty, and that while the father never owed man a pie the son has made frequent acquaintance of local law courts and law agents in the capacity of both plaintiff and defendant. These are broad assertions, but the following details of facts present to both the recollection and the experience of Berar officers will amply substantiate them.

As regards the unwillingness of the cultivator of the present day to personal labour, a modified exception may be made in the case of *malis*, *baris*, and *pajnis*; the rest of the different agricultural classes consider it derogatory to work with their hands, and employ labour instead until reduced to the very last stage of indigence and want. This disinclination is participated in by the entire household, and where mothers worked, and worked hard, weeding and gathering crops, their daughters employ themselves simply in the performance of domestic duties.

The extravagance of the Berar agriculturist is to be seen in his superfluous belongings. A cultivator of these times is seldom without his special *sowari* cart, his pony, and his buffalo; these are pure luxuries, perfectly dispensable; they do not contribute towards any agricultural ends, and they represent sources of primary outlay and continuous expense; but the penalties of debt and impoverishment will not induce their possessors to forego them. The convenience they afford him is small, but the conceit they enable him to indulge in is a great object, which to his mind and limited vision quite justifies equivalent sacrifices on his part. Extravagance, misplaced as it is in a class of persons whose frugality is generally above that of any other class, simply because it is an absolute necessity to comfortable rural existence, is an evil much aggravated in the instance of the Berar cultivator by the most downright improvidence. In every caste ceremony he recklessly undertakes the most ruinous expenses, not always indispensably necessary, and as regards the ceremony of marriage, he is here to be seen in his most spendthrift mood. Guests are invited from some times a hundred miles away. They come down in cartloads; their journeying expenses are all paid, and for days together they and their cattle are fed and treated after the most lavish fashion. Institutions as "*naulich*" girls are an indispensable adjunct, not because the extravagance can be indulged in by reason of ample means, but because it must be committed for appearance sake. In the neighbouring Presidency of Bombay a marked contrast might be found in the manner in which the agricultural communities conduct and manage their marriages. There also is a tendency to considerable extravagance, but it is well tinged with providence and forethought in this much, that when in the Satara, Nuggur, or Poona districts a cultivator gives or receives in

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BERAR.

Mr. Bahmanji
Jamasji.

marriage one half of his ceremonial expenses takes the form of presents of jewels—the most favourite Indian method of saving money. The all-absorbing feeling in Berar is to present an affluent outward appearance, which if not possible from means at hand must be effected by indebtedness. Superfluous caste ceremonies not known elsewhere have grown and do now flourish amongst the population of Berar, and these are instituted on the smallest pretexts; thus, the arrival at maturity of a girl entails rejoicings and feastings akin almost to the ceremony of marriage.

The tenacity with which the Beraree will prosecute a grudge against his neighbour, or press a claim for anything he considers obtainable, is another prolific cause of his being usually the possessor of very limited means. These disputes are generally confined to *mirasdars* and *watandars* of land whose class is very extensive, and who are principally fond of, first their land, and, secondly, their "*watan*." Fortunes are squandered, and want absolutely invited to overthrow a rival, to substantiate a claim, or to revenge a wrong. The Beraree, while he never forgets or forgives, will hope, and hoping, expect the most impossible things. He will use the means he may have as instruments of attainment, retaliation, or revenge without the smallest regard of his present state or his future prospects. Instances like the following are of frequent occurrence. Two brothers will conceive a claim to a certain acre of what they consider ancestral land. They have both of them much other land, but an especial fancy for this acre takes hold of them, a claim and counter-claim is generated. Proceedings are launched with the declaration on the part of each individual that he will press for possession even to Her Majesty's Privy Council, in village parlance "*Nandanugoo*," and each will reduce himself from comparative affluence to absolute beggary in the contention for the possession of this coveted and charmed, albeit miserable acre of land. Similarly, the origin of a grudge or dispute is often most trivial and contemptible; for instance, in Berar there exists a practice during weddings of presenting as a mark of especial consideration a "*Beeda*" (a couple of "*pan*" leaves rolled together with a few pieces of nut, &c.), to the head man of the village, and of marking him on the forehead with a "*Tilluck*" generally a dot of turmeric. Two brothers will enter into competition for this very empty distinction, and will squander their all in contending their rival claims to it. It would be, perhaps, interesting and instructive here to proceed to details, and to give an instance exemplifying the manner in which the ordinary agriculturist impoverishes himself to a greater degree in his pursuit of an indefeasible end. Having generated in his mind a claim or a process of retaliation or any other cause, he thus furnishes himself with means for carrying it to fancied accomplishment. He happens to have land paying a revenue of Rs. 102-9-0 to Government, and requires immediately, in March 1853, a sum of Rs. 100. He has recourse in this situation to a "*sowkar*" from whom he receives Rs. 95. In return for this he executes a bond for Rs. 50, payable on the reaping of next "*kharif*" harvest, *i.e.*, November of the same year, with interest at 2 per cent. per mensem, conditioning in default to pay an excess rate of interest to be calculated at Rs. 3-2-0 per cent. per mensem. For the moiety of Rs. 50 he enters into legal arrangement to deliver by February of 1854 five maunds of wheat and a kandy of gram, and in further default to deliver the same quantity, with 50 per cent. added, or the value of the whole at bazaar rates at some other date. Now, reading between the above lines it will be evident to anyone acquainted with normal agricultural conditions that as the "*kharif*" crop is never stored before the end of December, and the "*rabi*" before the end of February or the early part of March, that the contracting parties in the above transaction have agreed to, and accepted, conditions simply impossible of fulfilment, actuated to do so on the one side, the creditor, by prospective quadrupled returns, and on the other, debtor, by fancied or real want. On the

ate of the first payment becoming due, the sowkar demands liquidation; the borrower has not the money to meet the demand, nor has he any produce equivalent in value to its extent; he therefore temporizes, and ultimately replaces the original bond of Rs. 50 with another of Rs. 65, in which he conditions to deliver in the month of *Magh*, *i.e.*, February, two kandies of cotton at Rs. 32-8 each, albeit the selling rate of cotton at the time of effecting this agreement is Rs. 40 per kandy. It is further stipulated and agreed to, that in the event of failure to transfer the two kandies of cotton above-mentioned, payment shall be made in coin calculated at the selling rate of the staple at the time of failure. Now the total receipts of the borrower in the form of *kharif* field produce, from the harvesting of which he has to meet the obligations above incurred, is two kandies of cotton and six kandies of jowari. The two kandies of cotton he sells forthwith at 35 Rs. each, to be enabled to meet the Government revenue, the first instalment of which (Rs. 51-4-6) just then becomes due. The unexpended balance of Rs. 19 he retains for his household expenses. As regards the jowari two kandies are stored for seed, and for grain payments for field labour, the remaining four kandies being reserved for household consumption. Now the Rs. 65 bond falls due, the borrower has no cotton to deliver as agreed; the sowkar is importunate, the borrower cannot meet his wishes, and begs to be allowed to fall back on the alternative already provided for in the bond, and by virtue of which he acknowledges himself to be under a liability of Rs. 100 for two bojas of cotton. It should be remembered here that the selling rate of a boja at this time is only Rs. 45. The second agreement about the delivering of the *rabi* crop is now due; but the crop is not ready, and the borrower is compelled to adopt the alternative in this last agreement also, and to meet the "*dedhi*," *i.e.*, 50 per cent. added, agrees to deliver 11½ maunds of wheat and 2½ kandies of gram by end of March. In this month he harvests his "*rabi*" crop, which yields a kandy of wheat, 17 maunds of gram, and 3 maunds of "*til*." This he disposes of as follows:—

Of the wheat 12 maunds are kept for household consumption, the remaining 8 maunds being sold for Rs. 40. The *til* is sold for Rs. 12, and this just pays the balance of the Government revenue for the year, *viz.*, Rs. 51-4-6. The 17 maunds of gram the borrower offers to the sowkar who refuses to take it, as it is not the full quantity agreed, *i.e.*, 2½ kandies. To please the sowkar the borrower again accepts a liability of Rs. 300, made up of Rs. 225, for 2½ kandies of gram, and Rs. 75 for wheat, and in immediate liquidation pays Rs. 85, received by selling the gram refused by the sowkar, and executes a bond for the balance of Rs. 215. Reviewing the transaction above detailed, it is evident that, for a principal of Rs. 95 actually borrowed, the borrower has, in such a circuitous and mysterious manner, been compelled to pay Rs. 430, of which Rs. 85 are to his credit, the net liability thus amounting to Rs. 345. The transaction is thus continued from year to year, and the poor *kunbi* sold to the sowkar outright. The instance above quoted is between a common *kunbi* and a respectable Marwari. But if I were to point out cases of other money lenders, such as Marwaris, Rajputs, and others dealing with the *kunbi* in every village, it will be seen that instead of Rs. 430 in the instance quoted there would be Rs. 615, and a case recently came before me in which a sum of Rs. 150 only was borrowed, and though the defendant paid this Rs. 150 and more there was a balance of Rs. 160 for which suits were brought. Many such cases occur before me. I would mention here a celebrated money-lender of Nagpur, who goes by the name of "*Bootwala*." This sowkar pays only Rs. 67-8-0 for a Rs. 100 bond, which accounts for the sum as follows:—

Rs. 80 principal, with Rs. 25 added to it as "*sawai*" (*i.e.*, Rs. 25 per cent.) payable by Rs. 4 a month, first instalment as also other charges on account of god Balaji and discount, aggregating in all to

Rs. 32-8-0. In about two years a sum of Rs. 126 is made of the Rs. 67-8-0 originally lent. And when the original debtor, as above, dies, the *sowkar* knows full well that the deceased's liability extends to his assets only, under Act XXVII. of 1867, and that by a suit his interests will be damaged, so he avoids a court, and prevailing upon the four sons and the widow of the deceased by promises, brings them into his clutches by inducing them to execute a fresh bond in their names for the balance due by the deceased. To effect his purpose he lends them a small sum, such as Rs. 5 or Rs. 25, thus showing them that he is very lenient, giving also a further remission of about Rs. 50 from the said balance. He thus leads the sons and the widow to think that he, the *sowkar*, is very kind, and that they should not play tricks with him. In this way the sons and the widow saddle themselves with the deceased's liability. The *sowkar* again commences robbing these wretches as he robbed the deceased, being, in the renewal of the debt, much better off, inasmuch as he has now a hold upon five persons instead of one (the deceased debtor). This transaction expands as each of these sons get sons and deaths occur. But the *sowkar* was able to do as above, on account of the ignorance of the heirs; but when these happen to be clever they drive the *sowkar*

to a court, who, having in his possession a legally executed document, obtains a decree against the deceased's estate (now it is to be seen how this clever heir runs to the *sowkar's* house). In executing this decree (which, suppose is for 1,000 Rs.) two fields belonging to the deceased and worth about Rs. 200 are attached. (It is well known that a Beraree will not see his ancestral lands taken away by others at any cost, for a piece of land valued at Rs. 10 he would spend Rs. 500). After attachment the heir is compelled to go to his *sowkar*, and he goes and executes a bond for his father's debts with whatever interest the *sowkar* was obliged to let off in the suit, aggregating in all to Rs. 1,250, mortgaging at the same time the fields under attachment. But that ignorant man does not see that the Rs. 200 worth of fields will go away in a few days without reducing a pie in the Rs. 1,250. The poor man is thus deceived, and the *sowkar* not only keeps up his debtors either way, namely, avoiding a court, and going to it, but increases their number. I have found by my experience that a third of the cultivators of Berar is in debt in the above manner. I have come to this conclusion by the information I got, and inquiries made from the tahsildars, and the conversation I had with the cultivators themselves.

BOMBAY.

An inquiry into the economic condition of the ryot embraces considerations of the character of the country in respect of its fertility, of its climate, the state of agriculture, the social condition of the people, and their habits and customs. Of these, fertility and climate are elements most variable and uncertain in their nature, being affected by uncontrollable and eccentric influences. Nor are the other considerations less complicated and indefinite in their character. The task proposed, therefore, is somewhat difficult, and the success of the inquiry will depend in a great measure on the quantity and quality of the information available.

It would perhaps facilitate the inquiry if we consider separately, firstly, the ryot's income, and, secondly, his expenses.

It is very difficult to form an exact conception of the ryot's income and resources. If asked, he estimates the value of the grain produced on his land, and of the sugarcane and other garden products if his land admits of such cultivation, and says that is all the income he enjoys. But this does not represent his total receipts; it only forms the most important item of his income. He has other sources of gain, direct and indirect, which materially assist him in the maintenance of his family and his establishment. His land, even when he has no special grass lands, produces grass, by which he is enabled to maintain his cattle. He is even sometimes able to sell grass and thus add to his resources. He produces cucumbers and other vegetables on his ordinary fields, which his wife sells in a neighbouring market. His cattle give him milk, manure, and fuel in the shape of cowdung cakes, and his butter and ghee fetch a good price in the neighbouring town. He is often able to sell young bullocks and buffaloes with great advantage to himself. The karbee (straw) forms a very lucrative source of his income. He is seldom required to employ hired labour, unless he happens to have a very large holding, his wife and children assisting him in the labours of the field. He assists his neighbours, and they are willing to assist him in return. His children look after the cattle, and his women do sundry works, the value of which it is difficult to estimate accurately. When disengaged from his farm, he occasionally employs himself as a cartman or as a labourer, and thus adds to his income. In cotton districts his women are employed in the work of picking cotton, for which they are paid in kind, in proportion to the quantity of work done. They spin the cotton thus obtained and sell the yarn,

the amount realised being expected to provide the family with ordinary clothing.

It will thus be seen that the sources of the ryot's income, though apparently insignificant when separately considered, are so many, that in the aggregate they enable him to realise a sufficient amount for his maintenance. In the statements received, the ryots' incomes are represented to be rather low, and one may at first sight wonder how he is able to maintain his family within an income so narrowly circumscribed. But when the sundry sources of income enumerated above are taken into account, the mystery becomes perfectly explicable.

But it would be unfair if we omit to take an equally comprehensive view of the ryot's expenses. As a general rule he is never required to spend any cash in the purchase of grain for food. In nine cases out of ten he is able to sell his grain products after satisfying the wants of his family. He likewise never buys grass or fuel, but he has to pay for oil and condiments, as also for tobacco for himself and bangles for his wife. His payments are made partly in cash and partly in kind. In almost all the purchases made by his wife the latter mode of payment is resorted to. But it requires to be noticed here that in making payments in grain he is always a loser, though he is never conscious of it. In his eyes grain has comparatively little value, for it is produced in his fields, and half and quarter of a seer of it is nothing to him. The shopkeepers, however, are not so simple and generous, and they always manage to take from his ignorant wife more grain than the value of the goods or other articles which they exchange with her.

His expenses in clothing are regulated by his circumstances. But as a rule his dress is very simple, consisting of a little piece of cloth to hide nakedness, a small turban or rumal as a covering for the head, and a kamblee or a scarf hanging upon his shoulders. Cultivators very seldom use coats or jackets. Their women have each one or two sarrees and cholees (bodices), made of very coarse fabric. Their infants are given jackets, but as they grow up and play about in the street, they are generally seen without any clothing on. As he is required to spend cash in procuring his clothing, he generally keeps himself very poorly clothed. His clothing consequently is by no means an index of the quality of the food he uses; for he even uses milk and other simple luxuries at his meals sometimes, though he may be very wretchedly dressed. When he is in pretty easy circumstances, he

tries to provide his wife with a holiday dress, which lasts her for about 10 years.

On the occasion of festivals and fairs he uses better food, and spends some cash in buying sweetmeats and toys for his children, when his circumstances permit him to do so. Marriage is perhaps the most costly event in a native family. Even the poorest ryot is required to spend Rs. 25 or 20 at least. The birth of a child also puts him to some expense. Occasionally he has to incur expenses for funeral ceremonies, which vary from Rs. 3 to Rs. 10.

His expenses in agriculture form a very important item also. He has to purchase manure for his fields, and occasionally has to pay for cattle for agricultural purposes. He seldom thinks of constructing a new well as long as he is in straitened circumstances, but if his well requires repairs he cannot neglect them, however poor he may be. He has occasionally to buy a mota or a leather bucket to work his well, and a cart to fetch his manure.

The implements of husbandry have to be oftentimes repaired. It appears from a comparison of the statement appended that a ryot's expenses on agriculture are, roughly speaking, equal to about one-tenth of his land produce.

The above estimate does not include the land assessment and local cess. These latter are equal to about one-eighth of his land produce.

In speaking of a ryot's expenses, it deserves to be mentioned that he is generally hard up for cash, and therefore minimises his expenses where ready payment in cash is necessary. In spending his grain, vegetable, grass, karbee, and other things produced on his lands, he is generally lavish.

When a cultivator is able to save, he lays out his savings in buying bullocks, in providing himself and his family with better clothing, in making small improvements in his dwelling, in drink, in providing ornaments for his wife, in buying a cart, and in constructing a well. His expenses on marriages, births, clothing, &c. keep pace with his prosperity. He often likes to extend his support to his poorer relatives, and to enjoy the luxury of a tat or a conveyance.

Under ordinary circumstances, the ryot is generally able to manage his expenses within his income. But he is somewhat improvident and saves little, though he is often in a condition to do so. When he is required to undertake any extraordinary expenses, such as those for buying cattle suddenly lost, or purchasing a cart, repairing or constructing a well, his savings seldom come up to his requirements. He has then recourse to the village saucar, and this introduces a new element into his affairs. The ryot is simple, ignorant, and improvident; the saucar is clever and calculating, sometimes flattering and sometimes overbearing. In the long run, therefore, the cleverness of the one generally gets the better of the simplicity and ignorance of the other. In plain words, the cultivator is seldom able to get out of the clutches of the village saucar.

We have said above that extraordinary expenses compel the cultivator to go to the house of the village saucar, and as such occasions arise in the lifetime of every cultivator, a large proportion of the cultivating classes is to be found in a state of indebtedness. It appears that about 75 per cent. are in debt, 50 out of them being hopelessly involved, and the debts of the remaining 25 being so moderate as to enable them to retain credit.* The indebtedness of the ryot is readily but vaguely ascribed to heavy assessments demanded by Government, but it would not be too much to state that the ignorance, simplicity, and improvidence of the ryot, and the saucar's high usury, have much to do with it. In many villages it appears that the amount paid by the ryots as interest to the saucars for sums advanced by them is equal to the whole amount of the land revenue recovered by the State. It even exceeds in certain cases. The rates of assessment as a general

*The average income of a ryot and his average indebtedness stood in the proportion of 4 to 5.

rule are fair, with a few exceptions, perhaps, that may be found in some talukas in which revised rates have been introduced. It is probably in the manner of recovering the land revenue that severity is sometimes perceptible. Extraordinary misfortunes often befall individual cultivators, such as destruction of the crop by fire, inundation, mildew, &c.; but practically relaxation is sparingly shown in recovering the assessments, because in good seasons higher rates are not demanded, while inamdars and native darbars show some indulgence under such circumstances. They perceive the ryot's helplessness, and show him a degree of leniency which his condition deserves. The arrears are, however, afterwards recovered when the ryot gets a better crop, and he does not grudge to pay it. But when he is straitened in his means, he finds it a hardship to have to satisfy demands if they are rigorously enforced. He is then compelled to call in the aid of the village saucar, which places him entirely under his power. It is thus to the rigour used by the officials in recovering assessments, and not, as is vaguely supposed, to the rates of assessment levied, that the ryot's indebtedness is to be partially and indirectly ascribed.

There is another reason why the present system of assessment is sometimes found fault with by the ryot. Under the native régime the cess was calculated on lands which were actually under cultivation, the fallow and grass lands being generally excluded, and though the rates used were often high, yet the cultivator submitted to them ungrudgingly. At present, however, he has to pay assessment on all lands in his possession, fallow lands as well as those which he has actually cultivated. As a general rule, lands which bear dry crops, and those situated near the foot of mountains and hills, are cultivated by rotation, intervals of rest being deemed necessary to enable them to recover their usual powers of production, and sometimes to suit the convenience of the landholder. In this manner a large quantity of land remains uncultivated, and yet the cultivator has to pay his assessment indiscriminately for all lands at the rates fixed. The present rates are generally fair, and are in the long run likely to prove beneficial to an intelligent, careful, and provident peasantry. But the sensitiveness of an ignorant ryot to a present grievance, however slight, is somewhat keen, and he is not shrewd enough to discover the advantages of a system to realise which the profits and losses of several years have to be taken into account, and which, moreover, in many cases are rendered almost nugatory owing to his ignorance and improvidence.

For the purposes of a direct reference, a few typical instances of cultivators stating the number of persons in their families, the quantity of land in their possession, the produce of their lands, the assessments, and other important particulars of their economic condition, are given below for some of the districts from which information has been obtained. The value of karbee (straw) is included, but not miscellaneous items.

Belgaum.—Shidappa bin Takappa Terni is an inhabitant of Shirgaum, in the Belgaum collectorate, and has in his possession 119 acres and 22 gunthas of land, which is represented to yield an annual income of Rs. 1,706, the amount of assessment payable being Rs. 111.9.0. His family consists of 24 members, and he has 31 head of cattle. His expenses on agriculture amount to about Rs. 150, and he has to spend about Rs. 351 in purchasing articles which he cannot produce on his lands. His extraordinary expenses amount to about Rs. 100. His estate is worth about Rs. 4,000, and the store of grain about Rs. 500. He is considered to be in well-to-do circumstances.

Balu bin Linggouda, Patil, is an inhabitant of Danwad, in the same collectorate. His holdings amount to 30 acres and 35 gunthas, which give him an annual income of Rs. 245, while he has to pay in the shape of assessments Rs. 22.5.0. His family consists of 11 members, and he has 7 head of cattle. His expenses on agriculture amount to Rs. 15.10.0, and he spends Rs. 113.8.0 in buying things which cannot be produced on his lands. His estate is worth Rs. 50, and he has no store of grain. His debts are put down at

Rs. 345, and he might be said to be in bad circumstances.

Balgouda bin Gingouda, Patel, is an inhabitant of Nandgaum, in the Athani taluka, and holds 636 acres and 12 gunthas of land, which yields him an income of Rs. 2,932, while he has to pay Rs. 403 as assessment. His family consists of 20 members, and his cattle are 71. His expenses on agriculture amount to Rs. 480, and he spends Rs. 266 in the purchase of things which he cannot produce on his lands. His estate is worth Rs. 3,400, and his store of grain is worth about Rs. 750. He is in good circumstances.

Balgouda bin Amgouda, Patil, is an inhabitant of Ainapur, a village in the Athani taluka, and has in his possession 168 acres and 8 gunthas of land, which yields him an annual income of Rs. 1,264, while he has to pay Rs. 133.11.0 as assessment. His family consists of 34 members, and he has 31 head of cattle. His expenses on agriculture amount to Rs. 280, and he spends Rs. 389 in purchasing necessities which he cannot produce on his lands. His estate is worth about Rs. 150, and he has no store of grain; his debts are put down at Rs. 1,000, and he is considered to be in middling circumstances.

Basana bin Ningana Sidulal is an inhabitant of Sampgaum, in the Belgaum collectorate, and has 65 acres of land in his possession, which yields him an annual income of Rs. 343, while he has to pay as assessment Rs. 92.7.0. His family consists of 10 members, and he owns 18 head of cattle. His expenses on agriculture amount to Rs. 90, and he spends Rs. 106 in buying necessities which cannot be produced on his lands; while his extraordinary expenses are put down at Rs. 51.9.0. His estate is worth Rs. 1,041, and the store of grain in his possession is worth about Rs. 342. He is represented to be in good circumstances.

Baslinga bin Basana Chawati is an inhabitant of the same village, and holds 10 acres and 13 guntha of land, which yields him an annual income of Rs. 52.8.0, while he has to pay as assessment Rs. 15.15.0. His family consists of eight members, and he has in his possession five head of cattle. He spends nothing on agriculture, but is required to spend Rs. 129.12.0 in purchasing necessities which he cannot produce on his lands. His estate is worth Rs. 8; he has no grain in store, and his debts are put down at Rs. 200. He is evidently in bad circumstances.

Native States. Kolhapur.—Bapu bin Ambaji Mali is an inhabitant of Shiradwad, in the Ichalkaranji State of the Kolhapur territory. He has in his possession 50 acres and 37 gunthas of land, which yields an annual income of Rs. 875. The assessment on his land is Rs. 122.1.0, while his expenses on agriculture amount to Rs. 210. He has a family consisting of 26 members, and he owns 33 head of cattle. He spends Rs. 421 in purchasing necessities which cannot be produced on his land, while his other expenses are put down at Rs. 62. His estate is worth Rs. 400, and he has a stock of grain valued at Rs. 180. His debts amount to Rs. 1,600, and he is said to be in good circumstances.

Dhondi bin Govinda Mane is an inhabitant of Jakhale, in Peta Panhala of the Kolhapur territory. He

holds 25 acres and 10 gunthas of land, which give an annual income of Rs. 290. He pays Rs. 114.2.0 as assessment, and he spends Rs. 72 on agriculture. His family consists of four members, while the head of cattle in his possession are seven in number. He spends Rs. 26 in purchasing things not grown on his land. His estate is said to be worth Rs. 10, and his debts are put down at Rs. 400. He is represented to be in middling circumstances.

Babaji bin Yesu Kothar is an inhabitant of Sakbari, in the Baura state of the Kolhapur territory. He possesses 3 acres and 30 gunthas of land, which yields him an annual income of Rs. 57. He pays Rs. 26.9.0 in the shape of assessment. His family consists of six members, and he has only one head of cattle. He spends Rs. 19 in purchasing things not grown on his land. His debts are put down at Rs. 100. He is said to be in bad circumstances.

The above instances will suffice. Of the several districts the condition of whose ryots is described above Belgaum, Sattara, and the native state of Kolhapur are blessed with a soil and a climate very favourable for agricultural purposes. They are mostly situated near the Western Ghats, and are intersected with rich valleys and watered with ever running streams. The rainfall in these districts is generally sufficient. The districts of Dharwar, Kaladgi, and a portion of the Belgaum Collectorate and the native states of Miraj, Sangli, Mudhol, Jamkhandi, &c. have a rich black Deccan soil, but the rainfall is here fitful, and the facilities of irrigation therefore uncertain. The districts of Ratnagiri and Kolaba are situated on the coast below the ghats, and generally enjoy a copious rainfall. The monsoons burst here first in the Presidency, but the soil is for the most part rocky and poor. The Kolaba district is not so badly off in this respect as Ratnagiri, but the soil in both is vastly inferior to the districts above the ghats.

These physical peculiarities have differently affected the character of the ryots residing in different districts. The poverty of the soil below the ghats has stimulated the industry of the cultivator, while the fertile plains in Dharwar and other districts have fostered indolence in their occupants. The former is parsimonious, careful, and enterprising, and the Deccan ryot is extravagant, improvident, and sluggish; for the black soil fields with comparatively less labour give plentiful returns to their owners, while the poor ryot below the ghats, notwithstanding his exertions all the year round, is scarcely able to earn a decent subsistence.

There does not appear to exist any striking contrast in the condition of the ryot in a Native State as compared with that of his brother in the British districts, for, owing to long minorities, the territories of native Rajas and chiefs on this side have been managed directly or indirectly by British officers for several years past, and consequently the system of administration has been gradually made to assimilate with that obtaining in the districts directly under the British rule. It is only in those Native States which have long remained under an indigenous administration that materials for an instructive and interesting comparison would be available.

What is the condition of the agricultural population, and if depressed, what is the reason of their depression? Is it a fact that there is no net produce and that the land assessment is a tax on the wages of the ryot's labour? What does a ryot family spend yearly according to its present standard of comfort, and what proportion is this of the gross produce of an average holding? What proportion do the cost of cultivation and the land assessment bear to the same?

The present assessment of land in Bombay is based on a careful study of the past history of each district, what revenue has been demanded, what paid, and with what effect on its prosperity; that is to say, the basis is the rent which the district is found to have paid in past times without retrograding. This rent is

apportioned among and assessed on the fields by an elaborate calculation of the quality and position of the land. For land watered by the rain in the Deccan districts the highest average rate per acre is Rs. 1.1.10, and the lowest 6 annas 8 pies; in Guzerat the highest Rs. 4.3.11, the lowest Rs. 1.3.5. Inferior land is assessed as low as three farthings per acre, and very inferior land is not assessed at all, as being unable to pay any rent. Garden and rice land pay a higher rate. The assessment is thus strictly a rent. The rent is fixed for each field, and it is at the option of the ryot to take up any field or resign it. If an increased extension of cultivation is any test, the Bombay settlement must be pronounced liberal and judicious. But as enlarged cultivation may be due

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to increased population, and the peasantry are not in a position to indicate excess in the rents by leaving the fields unlet, it is necessary to have recourse to other criteria.

Private rents form one criterion. The incidence of the Government assessment on land has been ascertained by careful experiments to be less than one-sixth of the gross return on very ordinary cultivation. The new cash rents of the Bhowanagar State are about one-third of the gross produce, in some districts more, and yet the state is very flourishing. The talukdars of Ahmedabad, after a few deductions, divide the entire gross produce with their tenants in equal shares, yet they have no difficulty in keeping their tenants. The rule between the khotes of the Concan and their tenants is that the produce rent is not to exceed half the gross produce of rice, yet the khotes retain their tenants. That is to say, about three times the Government assessment may be taken without forcing the tenants to give up the land. The recent careful crop valuations give the value of gross produce in a large number of instances. On a field of wheat in Poona, the Government assessment is 8 annas per acre, the value of the crop is Rs. 28 7 0 per acre, and the private metayer rent would be at least Rs. 12 per acre. In an inferior crop the assessment is Re. 1 4 0 per acre, the value of the crop Rs. 11 per acre, and the private metayer rent would be about Rs. 5 per acre. In rice lands in Canara, the experiments give Rs. 74 8 0, Rs. 62 4 0, Rs. 44 6 0 as the value of the crop per acre on various fields, whereon the assessment is Rs. 2 3 6, Rs. 2 3 6, and Rs. 3 11 0 per acre.

Of course the produce rent varies with the season. But if Rs. 12, Rs. 6, and 0, are taken as the produce in a good, a middling, and a bad season, of an acre assessed at Re. 1, the produce rent on the three years will be about Rs. 8, while the Government assessment will be Rs. 3.

An inspection of the cases of individual ryots collected by Mr. Barvé leads to the conclusion that the assessment is not an oppressive proportion of the ryot's necessary expenditure. Of course good cultivation will make it a much more trifling proportion than bad cultivation. The merest quit-rent will be heavy to an idle and slovenly cultivator. It seems fair to argue on the results of tolerable industry and skill.

It is evident that the present assessments are far less than the produce rents sanctioned by immemorial custom, and that even the last are paid and yet allow a subsistence to the tenants of private proprietors.

It is said that the produce rents are popular because they adjust themselves to bad seasons; the tenant pays when he has wherewith to pay, and not when he has not. This suits the people. On the other hand the customary Indian produce rent keeps inferior lands out of cultivation, and taxes the earnings of superior skill and industry. These are evils. And the advantage of an elastic rent may be secured in case of the Government land revenue, by a moderate use of the plan of suspending collections in bad years, so that the ryot may pay, say 8 annas in a bad year and Re. 1 8 0 in a good year following, in lieu of Re. 1 in each of the two years.

The average production of food grains per acre has sometimes been assumed as Rs. 4 Indian maund, and the value Rs. 7 per acre. But 4 maunds is much below the average production, and, as the result of a number of experiments, it appears that the average value of gross produce (including straw) was, for wheat, in one experiment Rs. 19 per acre, in another Rs. 11, in a third Rs. 27, in a fourth Rs. 15; for joar, in one experiment Rs. 10, in a second Rs. 14; for rice, in one experiment Rs. 36, in another Rs. 27, in a third Rs. 44; for ragi, Rs. 27 per acre. The assessment bears to gross produce in these cases the proportion of $\frac{1}{10}$, $\frac{1}{12}$, $\frac{1}{13}$, $\frac{1}{14}$, $\frac{1}{15}$, $\frac{1}{16}$.

In the instances collected by Mr. Barvé, the average income from land admitted by the British ryots questioned is Rs. 9 per acre, and while the lowest is Rs. 4½, the highest is Rs. 25 per acre.

The expenses of cultivation are also commonly over-estimated. Mr. Stormont, manager of the Government farm in Khandesh, states the amount of seed used at 6 lbs. per acre for bajra, 3 lbs. for joari, 48 lbs. for wheat.

Then as to cash spent for labour. Mr. Barvé's examinees state it at a fraction over 1 rupee per acre on the average. The fact is that the ryot has the labour of his own family and ryots help each other. The expenditure in coin on farm labour in small holdings is very trifling.

If these data are applied to the average Deccan holding of 40 acres consisting of fair dry crop land * assessed at 1 rupee per acre, the result is as follows:—

	Rs.	a.	p.
Gross produce of 40 acres, at Rs. 9 per acre.	360	0	0
Deduct—			
Assessment -	40	0	0
Local cess -	2	8	0
Seed at 6 lbs. per acre=	8	0	0
240 lbs., at 30 lbs. per rupee.			
Interest and depreciation on estate of Rs. 215.†	40	0	0
Labour at 1 rupee per acre.	40	0	0
	130	8	0
Balance for ryot's living -	229	0	0

What then does it cost a family of, say, six people to live?

A table prepared by Mr. Barvé from the results of careful observation (printed below) shows that the food of a middle class adult cultivator on full diet costs 2 annas ‡ a day with grain at 32 lbs. per rupee. The food of a labourer costs 1½ annas a day, in the Concan even less. If the family consists of four adults and two children, his outside daily expense is 10 annas, or Rs. 228 for the year for the middle class cultivator, and 8 annas a day or Rs. 180 per annum for the labourer. Scarcity is habitually met by reducing the quantity of food.

The actual transactions, however, may be better represented thus:—

	Lbs.
Gross produce at 5 maunds of 82 lbs. per acre on 40 acres.	16,400
Deduct—	
Seed at 6 lbs. per acre -	240
Food 10 lbs. per diem -	3,650
	3,890
Balance of produce available for sale -	12,510
This is worth at wholesale price, 40 lbs. per rupee -	Rs. a. p. 312 12 0
Deduct—	
Expenditure in cash—	
Assessment -	Rs. a. p. 40 0 0
Local cess -	2 8 0
Labourer -	40 0 0
Replacement of imple-ments, &c.	40 0 0
Purchase of condiments, &c., according to table, at 3 annas 8 pies per diem..	83 10 4
	206 2 4
	106 9 8

* The average dry crop rate is 9 annas.
† The calculation of the Deccan Ryots Commission.
‡ Deducting the charge for fuel, which is collected, not bought.

The margin for clothes, ornaments, ceremonies, repayment of debt, is thus Rs. 106.98.* The ryot has besides the straw of his grain crop and the grass on the margin of his fields to feed his cattle with or sell. The cattle give him milk, fuel (cowdung), manure, butter, and ghó. The women earn some cotton for picking and spin it into yarn, and the men earn hire as carriers, when not engaged in their fields.

It will be observed that, allowing for bad and good farming and the presence or absence of debt, the above calculation tallies pretty nearly with Mr. Barvé's typical instances, and appears to be a fair statement of a middling ryot's condition in an average year.

It may be thought too favourable to be consistent with the known indebtedness of the peasantry. As to that, the fact seems to be that no one is less familiar with the above calculation than the ryot himself.

The peasant keeps no accounts; all his transactions are in the books of the village saucar and purveyor, into whose store the surplus passes and from whose store supplies are drawn. Grain is credited at a low valuation, and money advanced at high interest. The balance is commonly against the peasant, for every peasant has experienced a year now and then when the margin of surplus was wanting and supplies were obtained on credit. The effect of a fall in prices or a series of bad seasons on the above relations is obvious. The debit balance once started is manipulated by the saucar. At best, few of the peasants ever get a clear view of themselves as independent yeomen possessed of a little capital applicable to improvements; their idea of the connection between the grower and purchaser of produce takes the form of a running loan account. Their minds are never worked upon by the charm of possession, and it is natural that they should be apathetic and unenterprising. Of course there are well-to-do peasants who are not thus enslaved, nor is the system incompatible with the possession by all but the most bankrupt ryots of ornaments which come into use as a resource in time of famine, as was remarkably proved in 1876-77. But the system seems to exist everywhere, and is most

* The Survey Commissioner in an independent calculation makes the margin on a similar holding with the same number of persons living on it, Rs. 143 80.

powerful where the soil is poorest and other conditions of cultivation most unfavourable. It is not to be concluded that the ryot is therefore habitually miserable or desperate. It is the state of things to which he and his fathers were born and bred, and the effort to be self-reliant and enterprising would no doubt be to him much more uncomfortable than drifting in the hands of the village factotum.

It is a curious fact, but it is generally agreed that the great rise in prices at the time of the American war (1862-7), which would have emancipated a sagacious and provident peasantry from debt, actually added to the indebtedness of the Deccan ryots, as it inflated their credit and led them into extravagance. Another cause assigned on good authority for their embarrassments is the indifference and thriftlessness caused by the caprice of the rainfall, which gives now a year of great plenty and again a year in which the crop is insufficient to furnish the ryot's food and necessary cash payments.

Unfortunately the assumption of the Bombay Survey Settlement was that the peasant would be found capable of forethought, energy, and self-reliance. He has not proved so, and the experiment has failed. It is now asked whether the boon of heritable and transferable property in the land a ryot holds, so long as he pays the assessment, should not be withdrawn so far as to prohibit the sale of occupancy right for debt.

The heritable and transferable right is the point in which the British ryot differs from the tenant of a Native ruler. The latter pays a much higher assessment, and both are about equally in debt, but the Native ruler would never allow his land to be put up to auction for the benefit of the tenant's creditors. The credit of his ryot is therefore smaller. The ryot is a valuable chattel, and the saucar is not allowed to press the ryot by aid of the more rigorous process of the chief's civil court.

It seems hardly possible for the Government to resume a proprietary right in the land which it has formally ceded to the peasantry. Nor is this measure so unmixedly expedient as to recommend itself strongly, if what is amiss in the ryot's condition can be remedied in any other way. Perhaps the failure above noted is capable of yet being retrieved if the system is as sound as it is believed to be.

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ARTICLES required to make up the ordinary Meals of a Field Cultivator and Labourer in the Deccan, and of a Kunbi in the Konkan.

No.	Names of Articles.	Poona, Middle Maratha Cultivator.				Poona Kunbi Labourer.				Kunbi of Kolhapur.				Kunbi of Ratnagiri.			
		Grown up and working Male and Female.	Boy of 10 years.	Grown up Male.	Grown up Female.	Grown up Male.	Grown up Female.	Boy of 10 Years.	Grown up Man.	Boy.	Grown up.	Boy.	Grown up.	Boy.	Grown up.	Boy.	Grown up.
		Weight.	Value.	Weight.	Value.	Weight.	Value.	Weight.	Value.	Weight.	Value.	Weight.	Value.	Weight.	Value.	Weight.	Value.
1	Rice, 2nd sort	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6
2	Joari, 2nd sort	1 1/2 lb.	0 9	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6
3	Bajra	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6
4	Wheat	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6
5	Gram	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6
6	Ragi or Nachni	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6
7	Ghi	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6
8	Oil	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6
9	Salt	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6
10	Vegetables or pulse	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6
11	Milk	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6
12	Kokamb or Tamarind	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6
13	Cocoanut kernel	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6
14	Chilly powder	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6
15	Turneric	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6
16	Coriander	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6
17	Jira	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6
18	Asafetida	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6
19	Onions	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6
20	Garlic	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6
21	Salt fish	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6
22	Jagri	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6
23	Fuel	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6	1 lb.	0 6

Prices.—Rice at 16 lbs. to the rupee.
Joari, 32 " " "
Bajra, 36 " " "
Nachni, 32 " " "

* This charge is generally avoided by collecting fuel here and there.

SINDH.

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Col. Haig.

Dividing the agricultural population into larger and smaller holders, it may be said that the former are nearly all heavily encumbered with debt. The latter are, as a rule, indebted, but to a less extent in proportion to their means than the larger holders, who are for the most part wanting in the thrift and energy essential to success in agriculture, and too frequently extravagant and dissipated.

I subjoin two instances taken from the tribe of Shekhs, in the Sukkur taluka. The information was collected by a trustworthy employé of this department while revision operations were in progress a few years ago. A family consisting of two men (brothers), the son of one of them, a boy, two women, and five young girls; in all 10 persons. Their property consists of four bullocks, two cows, and a cart. They cultivate—

Land irrigated by well and under superior crops.	A. G.
Land irrigated by well and under wheat	0 30
Land irrigated by flow from canal under wheat.	1 20
Land irrigated by flow from canal under joari.	2 20

Total - 7 10

The average cereal produce is—	Mds.
Wheat	52 1/2
Joar	29

Total - 81 1/2

The annual consumption of the family is	60
And seed required	9 1/2

Total - 69 1/2

Balance sold	12
The produce of superior crops is—	Rs.
Ghur, 30 maunds, at Rs. 6	180
Tobacco, 18 " at " 5	90

Total - Rs. 270

Add 12 maunds of grain at Re. 1 8 0	18
Total money income from the land	288

Deduct expenditure—	Rs.
Manure, cane-seed, preparation of ghur, and assessment.	144
Provisions, such as fish, meats, sweet-meats, and condiments.	51
Clothing	35

Balance - Rs. 58

Other income—	Rs.
Sale of butter	11
Earned by the women (spinning)	24
Carting for about two months	30

Total net income - Rs. 123

The family live in a house worth about Rs. 200, and are free from debt.

In the next case the family consists of two men, the wife of one of them, two boys (about 10 years old), and four girls,—in all nine persons. They cultivate—

Well-irrigated land under superior crops	A. G.
Well-irrigated land under wheat	0 30
Irrigated by flow from canal under wheat	1 0
Irrigated by flow from canal under joari	2 0
Irrigated by lift from canal under joari	1 10

Total - 6 20

The average yield of cereal produce is—

Wheat	Mds.
Joar	39
Total	75

The consumption of the family is—

Grain	Mds.	Srs.
Seed required	54	39
Total	62	17
Balance of grain sold	12	23

Ghur and tobacco fetch	Rs. a. p.
Grain, 12 1/2 Mds., at Re. 1 8	270 0 0
Karbi (joar straw)	18 12 0
Total money income from land	298 12 0

Deduct expenditure—	Rs.
Cane-seed, manure, oil-cake, preparation of ghur, and assessment.	146 0 0
Provisions purchased	46 0 0
Clothing	30 0 0
Total Rs.	222 0 0
Balance of income	76 12 0

Other income—	Rs.
Sale of butter	11
Earned by women	24
Total net income	99 12 0

The family live in a house worth Rs. 150, and are free from debt.

The above information may be considered trustworthy. I hesitate to give other instances, as generally so little reliance can be placed on the accounts given of their condition by the people themselves. I should roughly estimate that four-fifths of the agriculturists of the Province are more or less in debt.

MADRAS.

Mr. Price.

Mr. Goodrich.

Mr. Price.—Cuddapah.—As a rule, in this district the cultivators, whether proprietors or occupying farmers, look mainly to the land as their means of subsistence. I do not in this category include the holders of puttahs below Rs. 10, as these can hardly be held to be farmers in the proper sense of the word.

The ordinary ryot lives upon the produce of his land. Where he is a small holder, all the members of his family assist in agricultural operations; where he is a man of some substance, he employs, upon a monthly salary, farm-labourers to the extent that he requires. Any surplus remaining after deducting the cost of maintenance and the payment of the revenue due to Government or of the rent to the landlord is devoted to the purchase of clothing and petty luxuries. Any balance which then remains is spent either in acquiring cattle or land, or, if the ryot thinks that he has enough of these, is either buried or converted into jewels for the females of his family. It is only when the ryot has acquired as much as he thinks necessary in the way of cattle, land, and jewels, that, if he does not bury his money, he assumes the character of money-lender, and gives loans at heavy interest to his less fortunate brethren.

One peculiarity of the rustic of Southern India is his fondness for borrowing. He wishes to marry his daughter or to bury a relative and perform the funeral ceremonies, his riches consisting chiefly in grain, cattle, and so on; he goes to the village saucar or the money-lending ryot, and borrows what is a comparatively high sum. It is a point of honour with him not to be niggardly in his display on such occasions, and he will obtain a loan for this purpose out of all proportion to his financial position, and incur thereby responsibilities which will hamper him for years.

Take, for instance, the following case: Although last year was one of famine, and he cannot be called a rich man, he spent Rs. 300 on his father's funeral ceremonies. He is a respectable individual of the fairly well-to-do ryot class, and this fact no doubt led him into a decided extravagance. Had he been economical, the village would have commented upon it, and he been put to shame.

I know for a fact that during the famine in the Cuddapah District, any one but a substantial ryot could not obtain a loan. I often made inquiries of the people on this point, and the almost constant reply was that the saucars said that land was of no value, and that the cases of "alive to-day, dead to-morrow" were so frequent that they would not lend without substantial security. Indebtedness is undoubtedly an institution of rural life in India; but I do not think that it is, as a rule, the result of the want of means of living, so much as of the inexplicable extravagance which mingles with marked economy in the life of the people of this country.

What the degree of indebtedness of the cultivating classes is, it is not possible for one to say or even estimate with any degree of useful accuracy. The period through which the country has passed has been of the most abnormal character, and the people have, since the famine has taken a turn for the better, gone to the money-lender for the means of starting again. The law courts are no test of the extent to which this has taken place, for the major part of these transactions will never appear before them, the loans

having been received from wealthier ryots, friends, or relatives. I asked the most intelligent native that I know in the district what he thought, and though himself a man of the legal profession, he told me that he could form no opinion.

Mr. Wilson.—Kistna.—I can answer this question only in the most general manner, and only with reference to the district I know best, the Kistna.

The ryots of the delta-irrigated villages of this district are as a rule in most comfortable circumstances; not a few are rich, and combine commercial with agricultural pursuits. The generality of the upland ryots are in fair circumstances so far as can be judged from external appearances; they are strong, hearty, and healthy to look at. With hardly an exception every ryot, even the poorest, owns his own ploughing cattle and implements of agriculture. There are few of the well-to-do ryots who do not own at least one bandy; those chiefly in use in the western taluks are known as "Oopara bandloo," small carts with wheels of solid stone or wood; they are not used much beyond the limits of the village. In the delta the dwelling-houses are chiefly of mud roofed with tiles or thatch; in places the ordinary mud hut has given way to a considerable extent to buildings of a more substantial character. In the western taluks the houses are of mud, or of stones in mud, with flat roofs constructed of wattle and dab.

I can give no opinion regarding the extent of the indebtedness of the ryots, but I know from my experience as a judge that the poorer classes of ryots are generally in the hands of the village saucar, who advances the expenses necessary for cultivation, recovering them in kind at a much lower value than the market rate of the day.

Mr. Goodrich.—A ryot paying an annual assessment of Rs. 100 spends about Rs. 50 in manuring land, paying wages to hired labourers, purchasing salt and other expenses paid for in cash. The value of the out-turn on the land may be estimated at Rs. 300. After deducting from this amount the annual rent and the land-cess (at the rate of half anna in the rupee) there remains a balance of Rs. 150. Of this Rs. 100 will go towards household expenses and maintenance of his family, whose labour is the mainstay of the farm. The balance is spent either in lending, in paying interest on old debts, or in purchasing ornaments, or in celebrating marriages. The above estimate refers only to cases where the ryot gets an average crop. If the crops fail so that he has not a saleable surplus to the amount of his sist, he will be obliged to borrow to pay the sist and must stint himself in food. The ryots in most cases have large families, consisting of from 10 to 20 souls. They all work in the field, and hired labour is employed only at the time of transplantation and reaping. They generally live in thatched houses containing two or three terraced rooms (with clay ceilings and a thatch over all) to suit the requirements of the family. A ryot paying Rs. 100 rent keeps two or three pairs of bullocks and one or two cows, whose calves he sells. It used to be estimated that about one-third of the families in the district were in debt, their debts amounting to half of their annual income.

It is believed that recent high prices have very greatly reduced the debts of the class.

sion has been approximately made good from statements furnished by the Board of Revenue of the average consumption of food grain per head, of seed per acre, and of the average value of each kind of grain in the districts in question.

The accuracy, however, of the statement is at best very questionable.

The following statement has been compiled from the only tabular returns of typical instances furnished by district officers in Madras Presidency.

The returns are very defective; no information regarding the consumption of food grains nor miscellaneous income (except incidentally in the case of the Kistna district) being included. The former omis-

MADRAS.

	Kistna District.	Nellore District.
1. Number of holdings enquired into	7	10
2. Average number of persons in family	7.857	8
3. " " cultivated acres	34.857	25.238
4. " out-turn of food grain	Kandies 11.628	Kandies 15.3
5. " consumption of food, grain and seed	" 8.892	" 9.38
6. " amount of surplus food	" 2.736	" 5.92
7. " value of	Rs. 104.181	Rs. 122.437
8. " net value of non-food grains	" 31.857	" 17.65
9. " amount of other miscellaneous income	" 24.285	" —
10. " total cash income over and above consumption	" 160.323	140.087
Outgoings.		
11. " revenue, rent, and cesses	" 114.035	Rs. 117.863
12. " payments for hired labour and village menials	" 89.142	" 101.05
13. " expenditure on non-homegrown necessities	" 33.571	" 88.
14. " total outgoings	" 236.748	" 306.913
15. " surplus or deficit of income over outgoings	" 76.425	" 166.826
16. " number of cattle:		
Oxen	7.428	6.6
Cows	4.142	14.2
Other animals	6.285	12.4
Total	17.855	33.2
17. " possessions, value of:		
Grain	Rs. 46.857	Rs. 11
Ornaments and cash	" 892.857	259
Chattels	" 34.857	53
Total	Rs. 974.671	Rs. 323
18. Number of persons indebted	4	8
19. Average amount of debt	Rs. 300	Rs. 737.5

MYSORE.

The ordinary ryot rarely if ever spends any large sums on what might be called luxuries or extravagancies; his chief expenses are the purchase of cattle, the purchase of clothes for his family, and of a few ordinary silver jewels for the women, and the usual expenditure on the occasion of a marriage or other ceremony. He lives almost entirely on his own produce. He generally keeps a moderate stock in hand, and the rest he disposes of and hoards the money, and after a series of good seasons there are few Mysore ryots who have not got coin buried in their houses of greater or less amount, and this is one of the reasons why, through the whole of the late prolonged famine, the cultivating ryots had as a rule sufficient to enable them to maintain themselves and their families, whilst the artisans and labouring population, who mostly live from hand to mouth, have died in thousands. In the earlier months of the famine, though many ryots came to relief works, the holder of a puttah rarely if ever came to a feeding establishment.

The ordinary ryots almost invariably sell their share of the rice crop, as they depend upon the dry crop for the support of themselves and their families. I also exclude grazing land from the extent of the holding, as in all unsettled taluks, and even in settled taluks during the famine, such lands were made free to the villagers, therefore the ordinary cultivator has been able to graze his live stock, consisting generally of two or three pairs of bullocks, some cows and she buffaloes free of cost, or at a very trifling charge, without let or hindrance over the extent available in the vicinity. The smaller ryots avoid the employment of hired labour as much as possible; they may have one or two low-caste servants permanently on the establishment, but as their families are usually large, ranging from five to 10, and as all are made to work, the bulk of the extra labour is employed by possessors of large holdings only.

The women and children of the ordinary cultivator

also contribute largely by other means to the family earnings. Throughout the year, whenever they are not employed on field labour, they cut grass and take it to the large villages and towns for sale. They also collect and carry minor produce, such as fruit, vegetables, chillies, dairy produce, woollen thread which they have spun, and sundry other articles, to the different fairs held in the vicinity. In fact every member of the family is bound to give assistance to the best of his or her ability, and industry and frugality are the leading characteristics of a ryot's household in this part of the country.

The ordinary rates of assessment per acre are for—

Wet	-	-	-	6	0	0
Dry	-	-	-	1	8	0
Garden	-	-	-	9	0	0
Grazing land, when rented	-	-	-	0	7	0

The ryot's house generally consists of one block divided into several rooms, with cattle sheds and a granary, or sometimes grain pits dug in the cattle-shed. The house is generally built of thick walls of glutinous mud with a thatched or flat roof, and prior to the famine tiled houses were to be seen in almost every large village, which showed that the people were prosperous and had money to spare for such purposes.

Until the recent calamity came upon them it was quite proverbial that even the smallest landholders or puttahdars were well-to-do, and the per-centage of those in debt was known to be very small indeed. This was made evident by the almost entire absence of poverty in the villages, by the people being invariably well clad and well nurtured, and by the fact that there was little or no arrears of revenue. The kists, in so far as the cultivating ryots were concerned, being paid punctually; the defaulters, as a rule, being either non-agriculturists, middlemen, or public servants who held lands and were liable for candayem.

MYSORE.

Colonel
Pearse.

MAP. I. QN. 9.

MYSORE.

Colonel Hay.

As contrasted with 1848-49, the number of registered cultivators has risen from 120,114 to 211,732, being nearly 76 per cent. The area under cultivation has similarly increased from 758,213 acres to 1,159,820 acres, the difference being 401,607 acres, or nearly 52 per cent.; but the average area under cultivation has fallen to some extent, that is, a cultivating ryot had on an average 6.37 acres in 1848-49, or about 30 years ago, whereas the average is now not more than 5.20 acres. This coincides with the generally received opinion that increase of cultivation has risen much more from petty ryots, labourers, and others taking up small portions of land than from the size of the holdings having increased. Many causes have contributed to this: population increased, the savings of those who have earned money on the coffee estates and in other ways have enabled them to start on their own account, the battai system has been abolished, restrictions in taking up and resigning lands removed, and prices of agricultural produce have risen; and the majority of those who save a little money prefer to set up for themselves rather than work under others. Hence the larger holders find it more difficult to get land and labour than formerly, and are unable to extend their holdings as they might perhaps wish to do.

There can be very little doubt that within the last 40 years, the position of the ryots has generally improved. During the early years of the late Maha Rajah, their condition deteriorated in consequence of a general fall in the prices of agricultural produce occasioned by the reduction in the number of troops, and from the want of occupation to the same extent as before of classes of people not agricultural, and low prices continued until communications were opened in every direction, and a demand arose on the east from the collectorates of the Madras Presidency and on the west from the Coffee District extending from Magar in the north to the Nilgherries in the south, and including Munjarabad, Coorg, Manantoddy, and Wynad.

It would certainly be supposed that when the great majority of the agricultural classes pay such small sums, the bulk of the people would be paupers, just able to pay their cesses in a good year and on the verge of starvation in a bad one, but the experience of the

late famine following on several bad seasons shows that many even of this class had more resources of their own than was supposed, or that they were able to obtain support from others.

It is admitted universally that the condition of the ryots has improved for a series of years past, and that this is apparent in their houses, utensils, clothing, and ornaments; that the standard of living has been raised; that capital has increased, and that the wages of agricultural servants have risen.

With regard to the amount to which ryots are indebted, different accounts are given in different places, and debts are of varied character. In many cases temporary loans are contracted, which are repaid within the year, and in others the family becomes permanently burdened. Loans in grain or money are constantly made by the richer ryots to poor men of their village, but this is in many cases as much for the sake of retaining the services of the borrower as an investment.

No absolute rule can be laid down as to the disposal of any surplus income. Generally a ryot looks in the first place to growing sufficient grains for his own wants, storing as much as possible as a reserve, and selling his other produce for cash. Formerly grain was hoarded to a large extent, but high prices tempted the people to dispose of it, and the practice is much less common now, although in the opinion of many the risk of famine was much lessened by the former usage. Savings are first invested in ornaments, and are said to be seldom applied to marriage expenses, for which the resource is borrowing. The gold and silver ornaments accumulated in past years saved many families from starvation during the late famine. I cannot give any exact statement of the proportion of the agriculturists in this division who are in debt, or what proportion their average indebtedness bears to their average yearly income. The number must have increased during the famine, but I have been surprised to hear in several places that fresh debt so increased was much less than would have been supposed, and the explanation given is that the people maintained themselves to the last by the sale of cattle, sheep, and ornaments, and that the prospects of the year were so bad that loans were not procurable.

Major W. Hill.

The greater part of the Mysore country is an undulating plain with a red soil, well suited for the growth of cereal crops, which are dependent on the ordinary showers of rain, which fall between the months of June and November. The cultivators of such lands, which are known by the term Kushiki (dry), are much the most numerous. The cultivators of Tari (wet) lands under tanks, and in the Malnad (rainy country bordering on the western ghats) are comparatively few in number. The following remarks may be held to apply chiefly to the economic condition of the ryot holding land in the Maidan (open country) directly from Government. The most marked features in their tenure is the very great number of petty holdings. In this district the average holding of a ryot is 15 acres in the Maidan and 30 in the Malnad. Unquestionably by such a system a comparatively large number of inhabitants is supported by the soil; but they are in a state little removed above penury. So far as the theory supported by Mill of the advantage of small holdings applies to Mysore, it is a mistake to imagine that the tenure leads to any great development of the resources of the land, or to greater attention being given to agriculture: on the contrary the smallness of the original capital possessed by a Maidan ryot, which amounts to not more than the sum needed for his support for three years, combined with the limited size of his holding, precludes him from turning the land to the best account. He must sow primarily for his own consumption more than for the market. It may be allowed that by following a system, which is based on the experience of centuries,

he succeeds in obtaining from the land the maximum return possible for a minimum expenditure; but of course with a heavier expenditure, which he is unable to give or afford, the yield of the land would be proportionately greater. He sows the cheapest of all grain—raggi, with a little oil-seed; while in many places the soil could yield cotton and even wheat. He is content with being the owner of a wretched breed of bullocks and buffaloes, which fare well enough in the rains, when grass is abundant, but in dry season exist on the few dry blades of grass that can be picked up in the fields. A larger breed of cattle would necessitate the growth of hay or joari, which the ryot from the smallness of his holding is unable to undertake in sufficient quantities for their support.

It would be unfair under such circumstances to draw any comparison between his economic condition and that of an English farmer; but on the whole his position is far advanced above that of the ordinary labouring class, and is certainly not worse than that of agricultural labourers in the Midland Counties of England. We can only look to the spread of education, the force of example, and the demand for any valuable product suited to the soil to cause any material improvement in his status.

In this district his habitation consists generally of a miserable thatched hut, divided into two partitions, without light or ventilation, the one for cooking the other for sleeping, and is shared not only by his family but by all his cattle. The walls are of mud, the floors are cleanly plastered with cow-dung, but are without a vestige of any furniture. He may be, and generally

is, ignorant, apathetic, and superstitious; still he is raised above need; and as he is temperate in his habits, perfectly content with his humble lot, and not overburdened with children, his wants are few. He has ordinarily food grain enough and to spare for himself and the members composing his undivided Hindu family, and by parting at the end of the season with his surplus stock of grain to dealers, or at the weekly markets, he is able with ease to meet the Government demand on his land as it falls due, also to buy the necessities of life, such as pots, cloths, and cumblics (woollen blankets generally worn by men in Mysore), &c. He generally adds to his income by the sale of the dairy produce of his cows and buffaloes, retaining only the buttermilk for home use; and on special occasions when he may require money, he is able to raise it by the sale of a bull-calf. Some of the ryots in the open country keep also a small number of sheep and goats, which add to their means. As every individual member of the household, from the little boy who herds the cattle up to the old mother who spins, cooks, and looks after the children, is expected to contribute their quota of labour either at home or in the field, there is seldom or ever occasion for hiring extra hands, except during the harvest. The ryot makes it also a point to lay by a store of grain, sufficient to last the year and more; and it is only when the crops fail two or three years in succession, that he and his household are pinched for food.

Whenever the value of land is enhanced by means of irrigation, or the soil is that known as black cotton, more valuable crops are raised and the circumstances of the ryots as might be expected are better. They live in better houses, they dress better, gain more, and have consequently more to spend: also such ryots as have extensive holdings are able to employ one or two agricultural servants to whom meals are given with a rupee a month as wages, and the yearly gift of a cumbly. Their houses are generally tiled in the form of a court yard (arium), and they are occasionally the owners of three or four head of good cattle. In the Malnad many of the landholders are Brahmans, most of whom have large isolated holdings, and are owners of valuable arecanut gardens. They live in large thatched houses. The condition of their sub-tenants corresponds to that of the ordinary ryot in the Maidan (plain) taluks; but many are in a very impoverished condition, owing to their crops being pledged beforehand to lenders of money, who are also traders, and are known by the term of Sutigédars.

Condition of the Labouring Class.—If the condition of the ryot of Mysore is regarded as low, that of the farm labourer is much worse. His wages, if he is engaged by the year, are almost nominal, and when hired occasionally for field work he receives As. 2 a

day, and his wife one anna in the villages of the Chengiri taluk; but in the Malnad the former earn as much as As. 4 a day in the heart of the season. Such payments are almost invariably made in kind. The agricultural labourers, who belong chiefly to the lower castes, generally in addition sub-rent lands from Brahmans and others, who do not cultivate themselves. If they are farm servants hired by the year they live with the ryot and are dependent on him for their meals and clothing, and receive a small wage in money, generally from Rs. 12 to Rs. 24 in the year. In good years the ordinary sub-tenant class have enough grain for their subsistence, but as they have not ever more than a few months' stock of grain in hand and are frequently intemperate in their habits, they are the first to suffer whenever a famine takes place. When they wish to marry their children, or at times when there is no field work, they borrow from their masters and forestall future payments, owing to which circumstance they can seldom or never free themselves from obligation. Their ignorance and apathy are such that they are at the mercy of those who are better informed, and wherever there is no extraneous demand for labour their position is one almost approaching to serfdom. As was to be expected, it was by this class that the miseries of famine were chiefly experienced; but, as pointed out in paragraph 15 of my printed memorandum on the queries put in Chapter III., the famine has not been altogether an unmixed evil. There is this ray of hope for this class, that they may, though at a terrible cost, have learnt a lesson of independence; while their masters may be forced, owing to reduced numbers, to give them better terms in future. How Government may aid this class and save them from the evils of famine when famines come are questions well worthy of the consideration of the Commission. Some such system as the yearly hire of labourers at fairs, as in Scotland, suggests itself as a probable means of causing farm labourers to know their own value and of freeing them from the imposition to which they are subjected and the chains of debt by which they are bound; but so difficult is it in this country to overcome long established custom and prejudices that any premature attempt to force a change in the present method of hiring with advances would result only in failure. As temporary migration to coffee plantations has done much good in liberating them from serfdom it should be freely encouraged, especially in famine years. Loans of grain should also be given to them in famine times on the security of their masters; for it is a truth, though a painful one, that many of this class, having lingered on in a state of semi-starvation in their homes, were so sick and emaciated when they joined the camps that they did so only to die.

RAJPUTANA.

RAJPUTANA.

Captain Barr.

Jodhpur and Jesalmir.—*Captain Barr.*—I am of opinion, both from my own observations during the limited period I have been in political charge of this district, and from information collected in the records of my office, that the ordinary economic condition of the portion of the agricultural population directly engaged in the cultivation of the land and possessing proprietary or occupancy interest in it, bears favourable comparison with the condition of a corresponding class in British territory. The description of proprietary and occupancy tenures which follows in my reply to question 10 will bear this out in some measure; I am unable to give typical instances to illustrate this, but I think the terms on which land is held, the extent of land generally held by even the smallest proprietor, the cheap rates at which labour can be employed, the simple tastes of the agricultural population of this district, all tend to show that the opportunities afforded for accumulating wealth are considerable, while the proof that advantage is taken of these opportunities may be seen in the herds of valuable cattle, horses, and camels which landed proprietors possess. The agricultural population having pro-

prietary rights are as a rule decidedly well off, a great deal of money is spent by them in marriages, and as a matter of course the older and more respectable the family is, the larger is the outlay under this head. Surplus incomes are generally invested in gold and silver ornaments, but there are few heads of families in Marwar and Jeysulmere who have not the reputation at any rate of buried wealth.

Among the chief Thakoors and Jagirdars of the State, who may be said to head the list of landed proprietors, there are many who have contracted debts, but in most cases this is the result of reckless extravagance or of an attempt to do more than is compatible with the income of the holding, the further down the scale of landholders we look, the more we observe freedom from indebtedness; probably much of this may be attributed to the fact that debts are not easily incurred by those whose means are ostensibly small, in a native state, where the procedure of the Civil Code, which gives the Bunniah in British territory so much ease and confidence, is unknown, or at best works with difficulty and uncertainty.

CENTRAL INDIA.

Bhopal.—None of the agricultural classes have any proprietary right in the land.

Baghelkhand.—The labouring class in Baghelkhand is as a rule very poor. No proprietary or occupancy right exists. Nearly all tenants are tenants-at-will, and some of the best, viz., Kols, are not even that, but merely regarded as chattels on the estate.

The principal tillers of the soil are "Kunbees," "Kachees," "Gonds," and "Kols." A Kol is as a rule fed and clothed by his master, who defrays all expenses connected with his own marriage or that of any children there may be of such, and the Kol on his part binds himself to work this out, and thus as it were contracts a voluntary slavery, and is styled "Hurwaha" or "lugoa." The other classes are merely tenants-at-will, and as a general rule it may be estimated that one may till by one plough about 12 khaures* of land, and about one-fifth of this is kept for grazing of cattle. In general the members of his family are five and sometimes six.

A.—Cultivator himself	-	-	1
His wife	-	-	1
His two sons	-	-	2
His one daughter	-	-	1
Total	-	-	5

B.—Cultivator himself	-	-	1
His wife	-	-	1
His one son	-	-	1
His two daughters	-	-	2
Total	-	-	5

The two sons of A. being married to the two daughters of B., make up the assumed number of five in each family. A tenant then, with five or six members of his family, has usually two ploughs to till 24 khaures or 48 pukka beegahs of land.

In purchasing salt, oil, and clothes, not realisable from land, he spends between 20 and 25 rupees per annum on himself and family.

Beyond a few cooking utensils, lota (brass), thali (brass), tawa (iron), he possesses no other property.

* Grain in Rewah is measured by khaurs. 1 khauri=22 koreyes, and each koreye has in it about 2½ seers of grain (wheat). Khauri is also a measure for land, and when applied thus means the quantity of land in which one khauri wheat or 20 koreyes x 2½ seers=55 seers are usually sown as seed.

Note.—Wheat is the standard by which an estimate has been made.

The exact size of a koreye or of a beegah differs in some localities of Rewah, but the measure noted here is in most general use.

In a khauri of land there are two bighas, each about 100 cubits or 50 yards long by 50 broad. A bigha in Rewah then is 2,500 yards, and one khauri is consequently 5,000 yards. An English acre is 4,840 yards, and the difference between an acre and a Rewah khauri is not much.

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HYDERABAD.

Economic Condition of the Agricultural Population directly engaged in the Cultivation of Land and possessing any proprietary or occupancy Interest in Land.

Excluding inamdars and cultivators holding land in alienated villages and in the Surf-e-khas districts, the Dewani portion of his Highness's dominions contains about 450,000 registered occupants. The strength of their families may be roughly estimated at 1,750,000 souls, which give the total number at 2,200,000, or a proportion of about one to four. The sub-occupants, co-sharers, &c. may be estimated at about 200,000 and the other members of their families at 800,000, making a total of 1,000,000, which bears a proportion of one to four. Thus the total number of those directly engaged in the cultivation of land, with the other members of their families, amounts to about 3,200,000.

He rarely, if ever, has any grain in stock; on the contrary, he generally disposes of his expected land produce long before it is reaped at extremely favourable rates to his creditor the Mahajan, from whom necessity has compelled him to borrow money or grain. The Mahajan supplies him with grain for food, for seed, for wages which are paid in grain to field labourers, and generally with all the tenant's wants.

The house of the Kol is the smallest and meanest of all, merely a hovel from three to four feet high.

The agriculturist has rarely any surplus income for either hoarding or lending; the ornaments of his family are generally of brass, bell-metal, or pewter.

His debts are payable either in money or in grain; the latter is generally borrowed at the time of sowing (for seed), to be repaid hereafter at 15 or 25 per cent. increase per half-year, at next harvest time. Amongst the lower classes of men a debt of money is incurred on the occasion of a marriage in the family, a sum of Rs. 20 being given to the parents of the bride.

From the absence of all reliable data it is impossible to answer this question very accurately, but from inquiries made it would appear that the amount of debt in a general way may be estimated at one-half of the yearly income, and rarely ever exceeds the total profits for a whole year.

Mir Shahamat Ali.—Ruttam.—The soil of Malwa needs no deep ploughing. Two bullocks for a plough are considered usually enough. A holding for a plough consists generally of 30 bighas of land, three of which are irrigated and 26 non-irrigated. On irrigated the cultivator raises opium and makka crops, and on the rest food-grains and other crops. Each plough is allowed on the part of the State four or five bighas of rent-free grass land. The produce of good crops of grass on the average is about 1,000 bundles each, being one pound in weight. The average rate of rent of irrigated land is Rs. 16, and of non-irrigated Rs. 12 0 per bigha. A cultivator, especially Hindoo, is generally very economical. His expenses of living and clothing are not very high. He lives within his means. His savings are often spent chiefly on marriages and deaths. His house also is not very roomy; one apartment for himself and family and the other for cattle are generally enough. Very few have separate houses for themselves and cattle. The houses are generally tiled. The number of cattle is estimated at the rate of 10 head per plough, viz., two bullocks for agricultural purposes and the rest for milk. He depends for manure on his cattle. The family of a cultivator consists on the average of not less than six souls. The proportion of the agriculturists believed to be in debt may not be more than 25 per cent., and the proportion indebtedness bears to the income may be about one-third. The debt is generally due to unforeseen circumstances, causing unusual loss in cattle or the produce of crops.

District.	Number of Cultivators.	Land held by each Cultivator in Acres.			Average Assessment per Cultivator in British Rupees.		
		Dry.	Wet.	Total.	Dry.	Wet.	Total.
1	2	3	4	5	6	7	8
					RS. A. P.	RS. A. P.	RS. A. P.
Mayduk - - -	14,482	6.16	3.32	9.48	23 3 2	36 6 5	59 9 7
Indur - - -	27,744	5.91	1.31	7.22	15 1 8	29 10 1	44 11 9
Yelgundul - -	39,548	8.15	2.8	10.95	12 13 0	26 8 6	39 5 6
Sirpur Tandur -	12,484	14.38	.19	14.57	9 14 5	1 2 1	11 0 6
Kummum - - -	41,707	8.64	1.68	10.32	11 15 4	22 14 2	34 13 6
Nulgoonda - -	22,023	19.65	1.88	21.53	22 6 10	18 5 3	40 12 1
Nagur Kurnul -	17,322	15.93	2.78	18.71	14 0 10	46 1 0	60 1 10
Total Telingana -	175,310	10.4	2.04	12.44	14 15 2	26 1 0	41 0 2

The total quantity of food grains produced in the area mentioned above may be estimated at about 1,157,909 tons, which may be valued at British Rs. 3,26,52,798. Besides food grains, the outturn of other description of crops raised may be estimated at about 26,487 tons, which may be valued at Rs. 77,16,722. Thus the total produce of the land in the Telingana district may be approximately set down at 1,244,396 tons, the value of which may be estimated at Rs. 4,03,69,520. Calculating on these data, we may set down the value of the average produce of food grain per registered occupant at Rs. 186 4 7, and that of crops other than food grains at Rs. 44 0 3, giving a total of Rs. 230 4 4.

It may therefore be said that the agriculturist pays the Government assessment (which, as shown above, amounts to Rs. 41 0 2) from the sale of the latter description of crops, while he defrays the expenses of cultivation and maintains himself and his family from the produce of his crops of food grain.

District.	Average Assessment per Cultivator in British Rupees.	Average value of Produce of each Cultivator's holding in British Rupees.	Proportion of Revenue to Value of Produce.
1	2	3	4
Mayduk - - -	60	392	6.59
Indur - - -	45	200	4.47
Yelgundul - -	39	216	5.49
Sirpur Tandur -	11	160	14.54
Kummum - - -	35	173	4.94
Nulgunda - - -	41	259	6.41
Nagur Kurnul -	60	326	5.43
Total average Telingana }	41	230	5.6

The rate of assessment per acre of wet land amounts to Rs. 12 12 2 and for dry Rs. 16 11, while the total average per occupied acre comes to Rs. 3 4 7. From the foregoing figures it will be apparent that the proportion which the Government demand bears to the value of the produce is from one-fifth to one-sixth. The staple grain of Telingana country is paddy, the total produce of which, spread on the entire cultivated area, gives 2.2 tons per acre, or a money valuation of Rs. 64 13 0 per acre. Of other food grains the quantity produced per acre is 0.25 tons or seven maunds, which may be valued at Rs. 7 13 0. Excluding grain, the quantity of other crops produced per acre amounts to 0.21 tons, and the value thereof Rs. 19 14 0. The quantity of all descriptions of crops raised averages 0.57 tons per acre, while the average value per acre comes to Rs. 187 11. Deducting the Government demand from the amount, the cultivator has left to himself the sum of Rs. 15 3 4 per acre, from which he

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has to meet the cost of manuring, the interest on the capital employed, the wages of labourers, and other expenses attendant on cultivation. This may safely be set down at about one-third of the value of the total produce. Thus out of every hundred rupees' worth of crops he raises the tenant has to pay Rs. 18 as Government revenue, and has to spend besides Rs. 33 for cultivation and for the interest on the capital employed. Deducting both these items, the amount left to the cultivator is Rs. 49, which represents the net profit that he makes, or, in other words, the cultivator has left to him for his exclusive use very nearly half the produce of the soil. These figures may perhaps lead to the supposition that the ryots of the Telingana province are flourishing and prosperous. To a certain extent this may be true, but these figures have to be taken with two reservations. In the first place the foregoing calculations have been based on the figures obtained for 1284 Fasli, a year in which there happened to be a particularly good rainfall, and which consequently resulted in a "bumper" harvest. Every season cannot be reasonably expected to be as favourable for the crops. In the Telingana districts the condition of the ryot is dependent on the state of the season; a good season makes him comparatively rich, while an unfavourable one leaves him miserably poor. Whenever the rainfall is copious the area of paddy cultivation is proportionately increased, and consequently the out-turn is plentiful. The cultivator endeavours to the best of his powers to extend cultivation, and the greater the area under cultivation the greater are his prospects of gain. In 1285 the rainfall was not so heavy as what occurred in the preceding year; in 1286 it was considerably below the average, while in 1287 it was very scanty indeed. The area under paddy in these years was consequently contracted to a considerable extent. As compared with 1284 Fasli the decrease in the area of cultivation was in 1285 Fasli 34.51 per cent., in 1286 Fasli 52.83 per cent., and in 1287 Fasli 44.32 per cent. The change thus wrought in the state of the cultivator by variations in the rainfall greatly affects his prosperity, and a single year's drought totally removes the good effects of the previous year's abundance, however great the out-turn of the produce for that year may have been. The second point to be taken into consideration is the circumstance that the above calculations are based on an average of the different classes of the cultivators, including both the prosperous and the indigent. I caused careful inquiries to be instituted respecting the different classes of cultivators entered in the rent rolls. The number of cultivators classified up to date is 127,516. The number of cultivators who pay an assessment of less than Rs. 15 per annum is 49.87 per cent., or one-half; of these the number that pay less than Rs. 5 per annum amounts to 25.42 per cent. It thus becomes evident that of the entire number of registered occupants nearly one-half of them are in indigent circumstances, earning from the soil only a bare subsistence for themselves and their families. For the Telingana province the following

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CHAP. I. QN. 9. statement gives a classification of the registered occupants with respect to the amount of assessment they pay—

HYDERABAD.
Montwie Madhi Ali.

No.	Cultivators.	Number of Cultivators.	Per-centage.
1	2	3	4
1	Paying below 5 rs.	32,406	25.42
2	" from 5 to 9 "	17,408	13.65
3	" " 10 " 14 "	13,778	10.80
4	" " 15 " 24 "	15,812	12.40
5	" " 25 " 39 "	14,069	11.3
6	" " 40 " 59 "	9,818	7.70
7	" " 60 " 74 "	5,685	4.46
8	" " 75 " 99 "	5,086	3.99
9	" " 100 " 124 "	3,366	2.64
10	" " 125 " 149 "	2,407	1.89
11	" " 150 " 174 "	2,001	1.61
12	" " 175 " 199 "	1,302	1.02
13	" " 200 " 249 "	1,320	1.4
14	" " 250 " 299 "	890	.70
15	" " 300 " 349 "	681	.53
16	" " 350 " 399 "	504	.40
17	" " 400 " 499 "	450	.35
18	" " 500 " 599 "	246	.19
19	" " 600 " 699 "	151	.12
20	" " 700 " 799 "	64	.05
21	" " 800 " 899 "	14	.01
22	" " 900 " 999 "	2	—
23	" " 1,000 " 1,499 "	4	—
24	" " 1,500 " 1,999 "	1	—
25	" " 2,000 " 2,499 "	1	—
26	" " 2,500 " 2,999 "	—	—
27	" " 3,000 " 3,999 "	—	—
28	" " 4,000 " 4,999 "	—	—
29	" " 5,000 and upwards	—	—
	Total	127,516	100

The foregoing statistics relate to the year 1284 Fasli, which, as has been mentioned elsewhere, was an exceptionally good year for crops. The out-turn in that year was considerably above the average. Then, again, the calculations given have been, based on the returns prepared by the village Patwáris, which are not to be entirely trusted for accuracy. It therefore becomes necessary to give here a tolerably correct estimate of what would be the area under cultivation, and the out-turn of produce in an ordinary year. This could only be done by taking the average of a series of years, which would include both good and bad seasons. I have consequently worked out the figures for the past eight years, and have struck an average therefrom. These years commence with 1280 and end with 1287 Fasli. It thus happens that they include exceptionally good as well as exceptionally bad seasons, and this circumstance materially adds to the correctness of the data obtained. It may once for all be stated here that the figures given below are based on an average obtained for the past eight years.

In the Telingana provinces, the area under wet cultivation may be estimated at 229,526 acres. An increase of 50 per cent. has, however, to be made on the area recorded, for this reason, that on most of these wet lands double crops are annually raised, and besides this, as has been pointed out on more than one occasion, the area recorded in the village papers is considerably below what is actually cultivated. Calculating on this datum, we get an area of about 344,000 acres of wet land. Out of this, about 14,000 acres of land may be set aside for the cultivation of sugar-cane and vegetables: this leaves 330,000 acres for the cultivation of paddy. Estimating the out-turn at 30 maunds per acre, which is very moderate indeed, we get about 353,000 tons of paddy, which may be said to be equal to 213,000 tons of rice. The money valuation of this produce, at an average rate of Rs. 30 per khandi (20 maunds), may be set down at Rs. 1,48,26,000. Estimating the produce of the area set aside for the cultivation of sugar-cane and vegetables at Rs. 40 per acre,

we get Rs. 5,60,000. The entire produce of the wet lands may, therefore, be estimated at Rs. 1,53,86,000.

We have now to estimate the produce of the dry lands. The area under dry crops may be set down at 1,595,392 acres. Allowing an increase of 60 per cent. over the recorded area, as has been done for wet land, we get about 2,553,000 acres. Out of this area we have to set aside 18 per cent. of land (about 459,500 acres) for the cultivation of other than food grains, which leaves 2,093,500 acres on which food grains may be raised. The out-turn of other than food crops may be valued at Rs. 45,95,000 at Rs. 10 per acre. The produce of food grains may be estimated at 374,000 tons at 5 maunds per acre, the value of which would amount to about Rs. 1,39,56,000, at Rs. 4 per pulla (240 lbs.). The money valuation of the produce of dry lands would therefore amount to Rs. 1,85,51,000. Calculating on these data, it may be said that the entire annual produce of the lands in the Telingana province amounts to British Rupees 3,39,37,000. The average Government demand on these lands amounts to Rs. 51,23,000. Thus the proportion which the Government demand bears to the entire produce is as 1 to 6.6. The average number of the registered occupants may be set down at 165,000. Deducting the Government demand, which on an average amounts to Rs. 31 per occupant, the sum of about Rs. 174 is left to each of them. From this sum the ryot has to meet the expenses of cultivation and to provide for the maintenance of himself and his family.

We shall now estimate the average annual out-turn of food grains and of other crops, the amount that is consumed in the Telingana province itself and the quantity that is left for exportation, &c. The total out-turn may be estimated at about 213,000 tons of rice and about 374,000 tons of other food grains, amounting in all to 587,000 tons. From this produce we have first to deduct for seed 14,700 tons of paddy (at 50 seers per acre), and 9,300 of other grain (at 5 seers per acre), making a total of 24,000 tons. The balance left is 198,000 tons of rice and 365,000 tons of other food grains, aggregating in all to 563,000. Next, we have to deduct from these figures the wastage that takes place, which may be estimated at 5 per cent. and which amounts to 31,000 tons. The total population may be roughly estimated at 2,160,000 souls,* and allowing 6 maunds of grain per head per annum, the total annual consumption may be set down at 463,000 tons. The quantity of consumption and wastage, therefore, amounts to 494,000 tons. Deducting the quantity set down for consumption and wastage from the balance left, after allowing for seed grain, we get 69,000 tons of food grains available for export, which is mainly rice, and may fairly be valued at Rs. 57,96,000. Thus the quantity available for export is between one-eighth and one-ninth of the total out-turn.

This account is for the whole province of Telingana. Following Mr. Elliott's plan, adopted by him in his report on the Mysore famine, let us now see how this account bears upon the agricultural population itself. We may estimate the total agricultural community at about 70 per cent. of the whole population, which in round numbers amount to about 1,512,000. This number includes the village artisans, labourers, and others who gain their livelihood from the land. The amount of consumption, calculated at the rate given above, may be set down at 324,000 tons, and the amount of seed grain and wastage at 55,000 tons, making a total of 379,000 tons. Deducting this quantity from the total out-turn, we have left 208,000 tons, which may be valued at Rs. 1,02,00,000. The figures represent the value of food grains alone. Of the other description of crops raised, the estimated value of the out-turn (allowing for wastage and seed at 10 per cent.) may be set down at Rs. 46,35,000. The total value of the entire out-turn may, therefore, be roughly set down at

* It may be mentioned here that according to the returns prepared by the Patwáris, the total population amounts to 1,662,103 souls, but it has been ascertained that the recorded population is much below the actual number, an increase of 30 per cent. is therefore made on the number given.

Rs. 1,48,35,000. From this we have to deduct the Government demand, which amounts to about Rs. 51,23,000. The profits, then, left to the agriculturists from the cultivation of the lands may be estimated at Rs. 97,12,000. Distributing this amount over the total number of registered occupants (165,000), the average amount of profit left to each amounts to Rs. 58.14. Comparing the results now obtained with those given for 1284 Fusli, we find that our estimate of the prosperous condition of the Telingana agriculturist will have to be considerably modified. The uncertainty of the seasons has a telling effect upon the condition of the cultivator. But for this uncertainty the ryot in Telingana would be a great deal better off than his brother in the Mahratta country. As it is, he lives almost from hand to mouth, and when overtaken with one or two bad seasons, he

has generally nothing to fall back upon. His life is one of continued toil and vicissitude.

Mahrattawari.—In the Mahrattawari province the number of registered occupants in 1,284 Fusli amounted to about 267,000. They occupied about 8,281,000 acres of land, of which 176,000 acres were wet, and 8,150,000 were dry lands. The assessment on this occupied area amounted to Rs. 87,70,000, of which sum Rs. 9,12,000 were for wet, and Rs. 78,58,000 for dry lands. The average occupied area per cultivator stood at 30.94 acres, of which .64 acres were wet and 30.3 acres were dry lands. The average assessment per registered occupant amounted to Rs. 3.66 for wet, and Rs. 29.66 for dry land, giving a total of Rs. 32.13 0.†

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HYDERABAD.

Montwie Mahdi Ali.

† Note.—

District.	Number of Cultivators.	Land held by each Cultivator in Acres.			Average Assessment per Cultivator in British Rupees.		
		Dry.	Wet.	Total.	Dry.	Wet.	Total.
1	2	3	4	5	6	7	8
Aurangabad	29,955	46.02	1.45	47.47	RS. A. P. 42 4 1	RS. A. P. 6 10 0	RS. A. P. 48 14 1
Beer	29,342	49.28	0.72	50.00	32 6 8	2 5 9	34 12 5
Purbhani	30,062	32.09	1.38	33.47	30 1 3	3 7 7	33 8 10
Beeder	21,567	17.43	0.31	17.74	31 4 8	3 3 9	34 7 9
Nandair	33,876	25.37	0.30	25.67	34 4 6	—	35 0 7
Nuldroog	10,137	48.59	1.14	49.73	29 15 8	4 13 3	34 12 11
Raichore	33,562	23.30	0.43	23.73	21 5 9	2 3 10	23 9 7
Lingasogoor	32,708	26.55	0.25	26.80	21 7 7	1 10 10	23 2 5
Shorapur	30,843	18.06	0.20	18.26	20 3 5	2 2 1	22 5 6
Gulburga	15,790	23.74	0.74	24.48	35 14 5	12 9 7	48 8 0
Total Mahrattawari	267,442	30.30	0.64	30.94	29 6 6	3 6 6	32 13 0

The total out-turn of food grains produced in this province during the year amounted to 1,599,000 tons, and of other than food grains to 230,000 tons, making in all 1,829,000 tons. The estimated value of this out-turn may be set down at Rs. 8,26,56,000, of which sum Rs. 6,08,34,000 is the value of food grains, and Rs. 2,18,22,000 of other than food grains. Calculating on these data, the average value of produce per cultivator amounts to Rs. 309.09, of which sum Rs. 227.74 is the estimated value of food grains, and Rs. 81.95 of other than food grains.

District.	Average Assessment per Cultivator in British Rupees.	Average Value of Produce of each Cultivator holding in British Rupees.	Proportion of Revenue to value of Produce.
Aurangabad	49	532	11.07
Bheer	35	575	16.42
Purbhani	34	367	11.10
Beeder	34	198	5.80
Nandair	35	260	7.43
Nuldroog	35	421	12.35
Raichore	24	162	6.75
Lingasogoor	23	194	8.89
Shorapur	22	198	9.00
Gulburgah	48	218	4.54
	33	309	9.40

It may therefore be said that less than half the value of the latter description of crop suffices to pay the Government demand upon the cultivator, and

thus the cultivator saves Rs. 176.39 for himself, after meeting the Government demand. The average assessment per acre of wet land amounts to Rs. 5.210, that for dry land Rs. 0.156, giving the total average rate per acre at Rs. 1.011. The per-centage of the Government demand, as compared with the value of the total produce, amounts to 11, and the proportion which the latter bears to the former is 9.09. As compared with the Telingana province, the quantity of paddy raised in the Mahratta Country is insignificant. We cannot therefore deal separately with the average produce of paddy per acre. The average out-turn of every description of food grains in these districts amounted to .24 tons per acre, or nearly seven maunds, the estimated value of which may be set down at Rs. 9.20. That of other kinds of produce amounted to .14 tons, the value of which may be estimated at Rs. 13.90. The total average for every description of produce was .24 tons, which may be valued at Rs. 10. The difference between this sum and the Government demand amounts to Rs. 8.151 per acre, which gives the sum that is left to the cultivator per acre. As in the case of Telingana, the ryot has to meet the cost of cultivation, and the interest on the capital employed, which may be set down at 25 per cent. of the total produce. He has also to pay 11 per cent. to meet the Government demand. Deducting these items, the net amount of profit left to him is 64 per cent. of the total amount of produce raised by him on his land.

The following statement gives the classification of about 200,000 registered occupants of the various Mahratta districts, with respect to the amount of assessment they pay:—

CHAP. I. QN. 9.
HYDERABAD.
Moulvie Mahdi
Ali.

No.	Cultivators.	Number of Cultivators.	
1	2	3	4
1	Paying below 5 rs.	22,552	11.45
2	" from 5 to 9 "	23,808	12.90
3	" " 10 " 14 "	26,036	13.22
4	" " 15 " 24 "	41,224	20.94
5	" " 25 " 39 "	35,775	18.17
6	" " 40 " 59 "	21,263	10.18
7	" " 60 " 74 "	9,029	4.59
8	" " 75 to 99 "	7,363	3.74
9	" " 100 " 124 "	3,880	1.97
10	" " 125 " 149 "	2,109	1.07
11	" " 150 " 174 "	1,253	.64
12	" " 175 " 199 "	741	.38
13	" " 200 " 249 "	823	.42
14	" " 250 " 299 "	427	.22
15	" " 300 " 349 "	244	.12
16	" " 350 " 399 "	131	.07
17	" " 400 " 499 "	130	.07
18	" " 500 " 599 "	54	.03
19	" " 600 " 699 "	29	.01
20	" " 700 " 799 "	12	—
21	" " 800 " 899 "	4	—
22	" " 900 " 999 "	8	—
23	" " 1,000 " 1,499 "	7	—
24	" " 1,500 " 1,999 "	5	—
25	" " 2,000 " 2,499 "	—	—
26	" " 2,500 " 2,999 "	1	—
27	" " 3,000 " 3,999 "	—	—
28	" " 4,000 " 4,999 "	—	—
29	" " 5,000 and upwards	—	—
	Total	196,908	100

From the foregoing statement it will be apparent that the number of cultivators who pay an assessment of less than Rs. 15 is only about 37.57 per cent., whereas in the Telangana province, the number is as high as 49.87 per cent. This shows that the condition of the cultivators in the Mahratta districts is somewhat better than in the Telangana districts.

In the Mahratta country, the uncertainty in the seasons is not so great as in the Telangana country. With a view, however, to obtain a tolerably correct estimate of the area under cultivation, and the produce derived therefrom, it will be better to base our calculations on an average of the past eight years (1280 to 1287 Fasli), which include good and bad seasons, as has been done in the Telangana district.

Estimating on these data, it may be said that the area of wet cultivation in the Mahratta province may be set down at 156,000 acres. From this area about 25 per cent. (39,000 acres) may be allowed for raising vegetable produce, which leaves about 117,000 acres for the cultivation of food grains. Estimating the out-turn at 10 maunds per acre, we get about 42,000 tons, which may be valued at Rs. 23,46,000, at the rate of Rs. 6 per pulla (120 seers). Estimating the produce of the area set aside for the cultivation of vegetables, &c., at Rs. 40 per acre, we get about Rs. 15,60,000. The estimated value of the total produce of wet lands may therefore be set down at Rs. 39,06,000.

We shall now estimate the produce of dry lands. The area under dry crops may be set down at 7,607,000 acres. From this, about 1,450,000 acres (19 per cent.) may be allowed for the cultivation of other than food grains. This leaves 6,157,000 acres on which food grains are raised. The out-turn of other than food crops may be valued at Rs. 1,74,00,000 at Rs. 12 per acre. The out-turn of food grains may be estimated at 1,319,000 tons, at six maunds per acre, which may be valued at Rs. 6,15,73,000, at the rate of Rs. 5 per pulla. The produce of dry land may therefore be valued at Rs. 7,89,73,000.

On these data, the total out-turn of the land in the Mahratta province may be valued at Rs. 8,28,79,000. The Government demand on these lands on an average amounts to Rs. 80,50,000.

Thus the proportion that the Government demand bears to the out-turn is as 1 to 10.3. The average number of registered occupants amounts to 260,000. Deducting the Government demand, which averages Rs. 31 per occupant, a sum of about Rs. 288 is left to each, from which the ryot has to meet the expenses of cultivation, and maintain himself and his family.

We shall now estimate the annual average out-turn of food grains and other crops, the amount that is consumed, and the quantity that is left for exportation. The total out-turn of food grains may be estimated at 1,361,000 tons. From this, we have first to set aside 33,000 tons for seed grain, at six seers per acre. This leaves a balance of 1,328,000 tons of food grain. Next we have to deduct for wastage, which may be estimated at 5 per cent., and which amounts to about 66,000 tons. The total population may be roughly estimated at 3,525,000 souls, and allowing six maunds of grain per head per annum, the total consumption may be set down at 755,000 tons. The quantity of consumption and wastage therefore amounts to 821,000 tons. Deducting this quantity from the amount of grain left, after allowing for seed grain, we get 507,000 tons, valued at Rs. 2,96,60,000, which is available for export. The surplus left is $\frac{1}{3}$ of the total out-turn.

This account is for the province at large. Let us now see how it bears upon the agricultural population. We may estimate the total agricultural population at about 65 per cent. of the whole, which, in round numbers, amount to about 2,291,000 souls. The amount of consumption, calculated on the datum given above, may be set down at 491,000 tons, and the seed grain and wastage may be estimated at about 100,000 tons, which gives a total consumption of 591,000 tons. Deducting this from the total out-turn, we have left about 770,000 tons, which may be valued at Rs. 61,70,000. But this account is only for food grains. Of the other description of crop raised, the estimated value (allowing for wastage and seed at 10 per cent.) may be set down at Rs. 1,70,64,000. The total value of the out-turn may therefore be estimated at about Rs. 5,32,34,000; from this we have to deduct the Government demand, which amounts to Rs. 80,50,000. The profit then left to the agriculturist, from the cultivation of the lands, may be set down at about Rs. 4,51,84,000. Distributing this amount over the total number of registered occupants (260,000), the average amount of profit left to each may be estimated at about Rs. 173.13.

We shall now combine the results obtained for the Telangana and Mahratta provinces, and give an account for the whole dominions. The total area under cultivation may be estimated at about 10,660,000 acres, of which 10,160,000 are dry and 500,000 wet. The area devoted to food grains may be set down at 8,698,000 acres, and for other description of crops at 1,962,000 acres. The aggregate value of the total out-turn of these lands may be set down at Rs. 11,68,16,000, of which Rs. 9,27,01,000 are for food grains (2,013,371 tons) and Rs. 2,41,15,000 for crops other than food grains. The total produce of the country amounts to 1,948,000 tons. From this may be deducted the quantity of food grains necessary for consumption, and for seed and the ordinary wastage. The seed grain may be estimated at 57,000 tons, the consumption for the country at large at 1,218,000 tons, and the wastage at 97,000 tons. The surplus grain left is 576,000 tons, which may be valued at about Rs. 3,54,56,000. The value of crops other than food grains may be set down (after deducting 10 per cent. for seed and wastage) at Rs. 2,17,03,000. The entire value of the produce, after making these deductions for consumption, seed grain, and wastage, may be set down at Rs. 5,71,59,000.

Let us now consider this account, as it bears directly on the condition of the agricultural population, who raise this produce. The estimated total agricultural population may be set down at 3,803,000, which include village artisans, &c. Their consumption would amount to 815,000 tons. Deducting this

quantity as well as that set aside for seed grain and wastage, the surplus left to the agriculturists may be estimated at 979,000 tons of food grains, which may be valued at Rs. 4,63,70,000. Of other than food grains the value (after deducting 10 per cent. for seed and wastage) may be set down at Rs. 2,17,03,000. The total valuation therefore would be Rs. 6,80,73,000. Deducting from this amount the Government assessment, which may be set down at Rs. 1,31,73,000, we get Rs. 5,49,00,000, which may fairly be represented as the profits of production left to the agriculturists of the entire dominions. Distributing this amount over the total number of registered occupants (425,000), the average amount of profit left to each would be Rs. 129.3.

The foregoing accounts relate chiefly to the out-turn of the land and the profits left to the cultivators. As regards their social and economic condition, it will be best to quote here from two reports, one submitted by Moulvie Nazeer Ahmed, Suddur Talukdar Northern Division, as regards the Telangana province, and the other by Furdoonji Jamshedji, Superintendent Revenue Survey, as regards the Mahratta province. Moulvie Nazeer Ahmed states—

The cultivators of Telangana are, as a class, idle, shiftless, and improvident; these characteristics being induced and aggravated in a great measure by two special causes—toddy-drinking and the influence of climate.

In this part of the country there will rarely be found a single individual, whether cultivator or labourer, who is not addicted to toddy-drinking. Among the females, though the vice is not so very general, a large number of young women of the lower classes are given to it. From about an hour and a half before sunset up to 10 p.m., the toddy shops are thronged, and a large part of the village population apparently passes away that interval of time in this foolish and injurious mode of dissipation.

The usual diet of the people is a kind of gruel called ambil, prepared by boiling a coarse ground flour of joar, lachna, sauva, or kodru in water. When ready it is well stirred and taken with butter-milk and salt. The ambil, which is prepared from kanki into a hard paste, is called gutka, and is the food usually taken during the day. At night they eat jowar or lachna bread and rice. A seer of this food is the usual day's allowance for either man or woman. Cultivators are much given to smoking, and their wives chew pan or betel-leaves.

Supposing that a family consists of a man, a woman, a grown-up boy, and two children, they would require three and a half seers of grain daily to support them, thus:—

Man.	Woman.	Grown-up Boy.	Each of the Children.
1 seer.	1 seer.	10 chits.	6 chits.

The amount of grain yearly consumed by a family is 32 maunds, or (if joar is the article of food) the produce of eight bighas or six acres will be sufficient to carry them through the year.

Each ryot cultivates both wet and dry lands. Out of wet cultivation the out-turn of sugar-cane goes to furnish articles of convenience and luxury, that of paddy to pay the Government revenue, cesses, and taxes, while food is supplied from the produce of dry land; and if insufficient the surplus of the produce of wet area is sold to make up the deficiency.

The average dry holding of each cultivator appears to be more than sufficient to supply him and his family with food, and should the season be favourable a moderately good surplus from the produce of wet area can be stored after paying off the Government demand. Supposing that the season is favourable and both the abi and tabi crops of rice are cultivated and yield a good out-turn, it has been found from inquiry in the Maydak district that the average value of the produce of abi paddy from one acre amounts to Rs. 55, that of tabi to Rs. 80. Deducting from the total sum the assessment, which on the average is calculated to be Rs. 13 per acre of wet land and about

Rs. 40 for the expenses of cultivation, the net amount saved per acre would be Rs. 80.

From the above statement it will appear that the cultivators might be well off so far as their income is considered; but their extravagant and dissipated habits, which have been alluded to above, prevent them from living in ease and involve them in misery. A great portion of their profit goes to purchase toddy and its necessary accompaniments, consisting of roasted meat of the coarsest kind or parched grain; the remainder is spent in the purchase of cattle, a portion being also invested in ornaments and clothing for their wives.

Those that hold the largest areas are patels and patwaris, who never let slip any opportunity to enhance their power and enlarge their holding at the cost of other and weaker holders. In 1275 Fasli, when the batai system was done away with and payment in money was enforced, the former suraostedars and the patels and patwaris, who from their cunning and knowledge of official routine had obtained power and mastery over the ryots, seized the occasion for their own aggrandisement, and secured for themselves exclusively many of the rights intended for the cultivators as a body.

Now, as the cultivators begin to appreciate the rights that were conferred upon them and the consequent advantages of their position, they are regaining their freedom from slavery and emerging from dependence upon the zemindars, patels, and patwaris. The necessary consequence will be that in Telangana the proportion of cultivators holding large areas will decrease. The number of tenants-at-will has not been entered in the above table, which, if taken into account, will still more lessen the proportion of large holders.

Furdoonji Jamshedji, Superintendent of Revenue Survey in the Aurungabad district, gives the following description of the condition, incomes, domestic occupations, &c. of the four classes of agriculturists in that portion of his Highness the Nizam's dominions.

"I may therefore class the landholders of this district as follows:—

	Per cent.
Prosperous by dint of other resources	15
In tolerably easy circumstances	60
In poor and precarious positions	25

"I will now proceed to describe some of the household arrangements of the various classes.

"*The Kunbi's Food.*—The domestic economy of the Kunbi's household is regulated by the eldest woman of the family, who makes an excellent housewife. Butter is made from the fresh milk of the dairy, and is sent to the market for sale, while the whey and curds go to improve the family meals. With respect to the cultivators of the first and second classes, the careful housewife sees that a supply of grain, calculated to last for a full year, is stored in the house, while the vegetables are supplied from the Kunbi's own garden land. The first class of cultivators generally take three meals a day. Breakfast is served out about 9 o'clock in the morning. It consists of hot joar or bajra cakes, a dish of milk curds, and some chutney. Between 12 and 1 o'clock they take their midday meal, which generally consists of joar or bajra cakes, some dal, and curry made with whey. The supper at night consists of bread and some one kind of home vegetables; the brinjal (egg plant) seems to be one of the favourite dishes of the Kunbis about this part of the country. This is sometimes varied with a dish of bayson, made of gram flour. The men and the children take their meals first, and are waited on by the women. They eat off brass plates, called thalis. When their lords and masters have finished eating, the women of the family sit down to their meals, and dine out of the same brass plates, without taking the trouble to clean them. The meals are served out to the labourers by the women, each man getting a daily ration of about four breads (=2 lbs.) and some dal or curry. This class of Kunbis are tolerably clean in their habits; both men and women wash regularly, and change their clothing every three or four days.

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In the better class of cultivators, the eldest member of the family generally stays at home, while the rest of the men proceed to the fields at dawn, performing their morning toilet in a stream, or at a well on the way. They carry with them the remains of last evening's supper, on which they breakfast at about 8 or 9 o'clock. About noon the women bring them their meals, which generally consist of fresh cakes of bajra or joar and a dish of dāl (pulse), or curry made with whey or vegetables. Sitting under a tree, the men partake of their noon-day meal. Between 8 and 9 o'clock in the evening the men take their evening meal at home, which generally consists of fresh bread, and one dish of dāl or vegetables, with some chutney; it may be mentioned here that Kunbis eat chutney with every meal. Sometimes they dine off milk and bread. This class of cultivators wash and change their clothing every fourth or fifth day.

In ordinary years the middle class of cultivators also eat thrice a day, but instead of always getting a dish of dāl or vegetables, they have often to be contented with the more humble fare of onions or chutney and bread. This class of cultivators are also tolerably clean in their habits.

In years of plenty the poorest class of cultivators take three meals a day, but in seasons of scarcity they have to restrict themselves to two. These meals consist of coarse bread of bajra or joar, and often of kulthi or mutt, and this is eaten with chutney or onions, and, very seldom, with a dish of herbs or vegetables.

It may be mentioned here that in talukas where kharif crops are chiefly grown, the cultivators live on bajra all the year round; but where both kharif and rabi crops are raised, they subsist on bajra from the beginning of Kartik (November) to the end of Māgh (March). From Phalgun (March) to Ashwin (October) joar is eaten. From the end of Paoosh (February) to the beginning of Phalgun (March) the cultivators in the rabi talukas roast and eat the tender succulent joari and wheat in the ear. From the time that the tender grain is ripening in the ear till it is harvested, the families of the poorer classes of cultivators mainly subsist on the hūldas, as the tender grain is called.

The Kunbi's Dress.—It will thus be seen that the cultivators of the better and middle classes live com-

fortably, while the diet of the poorest class is tolerably good and sufficient in quantity. The former are well fed and well clad; the latter have sufficient to eat and are fairly clad. The ordinary dress of a cultivator of the first or second class generally consists of a heavy turban of good stuff, an angurkha or long coat, and a dhoti, of good material. He also generally wears some ornaments of silver, and occasionally of gold, about his person. The ordinary dress of a cultivator of the third class is much the same as above, excepting that it is of very coarse material, and instead of wearing a jacket or angurkha, he very often wraps a cumblī or dhoti round him. It is seldom that he wears ornaments. The women of the first and second classes are clad in sadis (long entire robe) and cholis (bodices), of tolerably good material; those of the third class wear coarser materials. They also wear silver ornaments. But the cultivators of the fourth class are miserably clad. A piece of cloth round his loins; a dirty turban, often in shreds, over his head; a coarse blanket to protect him from the wind and rain; and a tattered jacket, reserved for festive occasions, generally comprise the sole wardrobe of a cultivator of this class. A couple of coarse sadis and the same number of bodices, form the only dresses which this class of Kunbi women can boast of. But, poor as this class of cultivators are, they are contented with their lot, and in prosperous seasons, when plenty smiles over the land, a more happy and cheerful set of people can seldom be met with.

Estimated Income and Expenditure of an Agriculturist of the Middle Class.—The proportion borne by the registered occupants to the agricultural population in the assigned districts is 1 to 4. The average holding of each cultivator is about 50 acres, and the average number of bullocks about four. I will now calculate the average annual income and expenditure, in ordinary years, of a Kunbi cultivator of the middle class, with his wife and three children, aged 10, 12, and 14 respectively, and holding 50 acres of land, which he tills with two pair of bullocks. It must be presumed that he is a hard-working, thrifty farmer, and that he grows joar (rabi) on 40 acres, and bajra (kharif) on 10 acres of his holding. His income from the land, and his total expenditure, will then stand much as follows:—

Income.	Seers of Grain and Bundles of Kurbi.	Aggregate Value.	Total.
12,000 seers of joar and bajra, estimated produce of 50 acres of land at 6 maunds (480 lbs.) per acre, and valued at 25 seers (50 lbs.) per rupee.	12,000	RS. A. P. 480 0 0	RS. A. P.
12,000 bundles of kurbi (joar stalks), estimated at 300 bundles per acre, and valued at 8 annas per 100 bundles.	12,000	60 0 0	
5,000 bundles of surrum (bajra stalks), estimated at 500 bundles per acre, and valued at 4 annas per 100 bundles.	5,000	12 8 0	
Total out-turn in Rs.			552 8 0
<i>Deductions made.</i>			
Seed-grain to be reserved for sowing purposes, estimated at 5 seers of joar per acre, and valued at 25 seers per rupee.	125	5 0 0	
Baluta payments, estimated at about 4½ per cent. of the produce	500	20 0 0	
Grain to be stored for home consumption for the year for five persons, estimated at the rate of ¾ seer (1½ lbs.) per head per diem.	1,350	54 0 0	
Wastage, estimated at the rate of 5 per cent. on the total produce	600	24 0 0	
Kurbi reserved for two pairs of bullocks for four months, estimated at about 25 bundles per two pairs per diem, and valued at the rate of annas 8 per 100 bundles.	3,000	15 0 0	118 0 0
Estimated balance in hand { Grain	9,425	377 0 0	
{ Kurbi and surrum	14,000	57 8 0	434 8 0

Expenditure.	Seers.	Total.	Grand Total.
<i>Expenses of Cultivation.</i>			
Two pairs of bullocks, valued at Rs. 60, at Rs. 30 per pair, estimated to last six years.	—	RS. A. P. 10 0 0	RS. A. P.
Oil-cake, &c., two pairs of bullocks during four months of the hot season, estimated to cost about Rs. 3 per pair per mensem.	—	12 0 0	
Cost of agricultural implements spread over the number of years they last, including cost of ropes required to be renewed annually.	—	10 0 0	
Government assessment at the average rate of Re. 1 per acre	—	50 0 0	82 0 0
<i>Expenses for Food, &c., excluding Grain.</i>			
Oil, at 2 seers per mensem	24	5 0 0	
Salt, at 2 seers per month	24	2 8 0	
Red pepper, at 2 seers per month	24	5 0 0	
Spices, at 4 annas per month	—	3 0 0	
Vegetables and pot-herbs	—	4 0 0	
Festivals	—	10 0 0	
Average annual expenditure for births, marriages, and deaths	—	25 0 0	
Extraordinary expenses, including amount of interest, &c. paid to Saucar on rare occasions.	—	50 0 0	104 8 0
<i>Dress.</i>			
2 country blankets, at Rs. 1 4 0 each	—	2 8 0	
8 dhoturs, for four male members of the family, one to be used as waist-cloth, and the other for covering the body.	—	5 0 0	
4 khadi (home-spun) jackets for cold weather wear	—	4 0 0	
4 common turbans	—	4 0 0	
4 pairs of shoes	—	2 0 0	
2 sadis and 2 bodices for the cultivator's wife	—	4 8 0	22 0 0
Total estimated expenditure, Rs.	—	—	208 8 0
Estimated balance to be saved to meet bad seasons	—	—	226 0 0
			434 8 0

Out-turn of Grain per Acre.—In justification of the foregoing, as being within the average production, it may be mentioned that given a good season, the best black soil and good tillage, the out-turn of joar sometimes amounts to as much as 14 maunds (1,120 lbs.) per acre. At the village of Nevurgaon, situate on the banks of the Godavari, in the Vajapur taluka, one of our survey classifiers holds some lands. He states that this year, notwithstanding the injury caused by excess of rain, the produce of his field, on which he had raised joar, was estimated at 12 maunds per acre. Mr. Rustumji Nusserwanji, the talukdar of the district, personally conducted several experiments in the Aurungabad taluka with a view to ascertain the out-turn per acre of the different kinds of rabi grain. His experiments were made this year, when, as has been stated above, the whole of the crops were more or less damaged by excess of rain, not to mention the depredations committed by rats. With all these drawbacks, the results arrived at were not unsatisfactory. Of 25 fields of joar experimented upon, the average out-turn per bigha amounted to 5 maunds 9½ seers, or 7 maunds 1 seer per acre. In the same way, the average out-turn of 45 fields of wheat experimented upon amounted to 4 maunds 11 seers per bigha, or 5 maunds 28 seers per acre. Of 10 fields of grain examined, the average out-turn came to 5 maunds 7 seers per bigha, or 6 maunds 36 seers per acre. Taking all these circumstances into consideration, I have adopted 6 maunds per acre as a fair average for valuation of a ryot's income.

It may be observed that the above statement does not include the cost of weeding, harvesting, threshing, &c. With a family of four, a cultivator is seldom obliged to employ hired labour for these purposes, as much work of this kind is performed by mutual help. One family will help a neighbouring family in reaping their harvest, and they, in return, will assist them likewise, and so on. Where this is not the case, the boys, when their services are not required on their father's farm, go out to work as labourers, and their earnings—not included in the above estimate of income

—go towards the payment of hired labour, when it is required to assist in reaping, threshing, &c.

With a holding of 50 acres, 40 of which he devotes to joar, and 10 to bajra, the cultivator, with his family, will work pretty much in the following order of time:—

Field Operations for the Year.—In the middle of Vaisāk he will prepare his land for joar with the vukkhur; this will take him eight days with two vukkhurs, at five acres per day. Another day will be occupied by himself and his family in removing the scrub and thorns from the land so prepared. In the month of Jayste he will work his previously ploughed land on which he had raised bajra last year with a magdā (harrow). He will take seven days to do this with one harrow, at about 1½ acre per day. He will now prepare 10 acres of land for bajra with the vukkhur; with two of these implements he will do this in two days, at five acres per day. In Ashad he will level his land for joar with the vukkhur: this will occupy him a week. Then, for the third time, he will level his kharif lands with the vukkhur, which will occupy him two days. He will now take two days in which to sow his kharif lands. In Shravan he will, for the third time, level his rabi lands in operation which, with two vukkhurs, will take him eight days. He will now weed his kharif lands, with a bullock hoe, which he will do in a day. In Bhādrapad and Ashwin he will enclose his fields with a hedge of thorns; this work will take him and his family about four days. He will then sow his rabi crops; this will take about 16 days. His youngest boy will now watch the ripening bajra crop for 15 days—the latter half of Ashwin. In Kartik and Margayswur one of his sons will watch the kharif crop during the first week, while he weeds his rabi crops with a bullock hoe. He now cuts his bajra, and this, with the help of his wife and two elder sons, he will accomplish in a week. He then requires about four days to bind the sheaves and to stack them. After that he will begin ploughing that portion of his field from which he has just removed the crop: this will take him about 27

CHAP. I. QN. 9. days, or nearly a month. He will now separate the bajra heads from the stalks, which, with his family assisting, will occupy about seven days. In Paoosh he will thresh and winnow his bajra crop, which, with the assistance of his wife and one of his sons, he will do in about four days. He must now crossplough his kharif lands, and this will occupy him about 26 days. Now Māgh has arrived, and the joār has to be watched. Crops growing on high land where the roots cannot readily reach the sub-soil moisture, have now to be harvested, otherwise they wither. In this way about five acres will be harvested. Before the month Phalgun the Kunbi has to reap 35 acres of his jowar crop. With his wife, two of his elder sons, and four labourers, he will execute this work in about a fortnight. With the help of his family, he must then bind the sheaves and stack them: this will take him about four days. Afterwards carting the harvest yield to the threshing-floor will occupy about 10 days. While he is so engaged his wife and children will prepare the threshing-floor, plaster and smooth it with cattle-dung, and enclose it with thorns. In Chaitur and Vaisāk the family break the joār heads from the stalks, which occupies them about 20 days. The threshing can be done in about six days, and the winnowing will take as many more. Giving out balutā (village servants' shares) will occupy the cultivator about two days.

According to the above distribution of his time, the ryot and his family will be engaged in field work for the following number of days:—

Ploughing	-	-	53 days.
Harrowing with magada	-	-	7 "
Levelling with vukkhur	-	-	28 "
Sowing	-	-	18 "
Weeding with bullock hoe	-	-	5 "
Enclosing fields with thorns	-	-	4 "
Watching the ripening crops	-	-	30 "

Reaping	-	-	-	31 days.
Carting	-	-	-	10 "
Separating heads of corn from the stalks	27	"		
Giving out balutā	-	-	-	2 "
Threshing and winnowing	-	-	-	16 "
Total	-	-	-	231 "

It will thus be seen that, out of the 365 days in the year, the field work will occupy the cultivator and his family 231 days, leaving 134 days to be otherwise occupied. Some of these must be counted for holidays, illness in the family, executing repairs at the homestead and for various other duties. Yet, allowing for all these, the Kunbi has a few weeks left, which can be profitably employed by himself or members of his family, in labouring for hire in other than his own fields, in carting or on public works, when there are any going on in his neighbourhood."

The majority of the cultivators in the Telangana province are involved in debt. Those that employ their own capital to meet the expenses of cultivation and pay the Government demand are few in number, probably not exceeding 20 per cent. The rest are all involved in debt, and of these as many as 40 per cent. have to depend upon the money lender even for the pettiest loan. They draw on him for ordinary household expenses, for the purchase of agricultural implements or bullocks, and for meeting the Government demand.

Whenever they stand in need of money, they resort to the Saucar for assistance, and in return they place at the Saucar's disposal the entire produce of their land. Some of the talukdars in the Telangana districts have instituted minute inquiries into the state of indebtedness of several cultivators in certain villages of their districts, the result of which may be tabulated as follows:—

STATEMENT A., showing the Number of Cultivators in debt and not in debt in the districts of Telangana for the year 1287 Fusi.

No.	Name of District.	Number of Talooks.	Number of Villages.	Number of Cultivators			Per-centage	
				In Debt.	Not in Debt.	Total.	In Debt.	Not in Debt.
1	Khumnum	3	20	1,051	520	1,571	66.90	33.10
2	Nalgunda	5	25	815	294	1,109	73.49	26.51
3	Yelgundel	4	13	798	255	1,053	75.79	24.21
4	Sirpur Tandur	3	—	9,621	4,534	14,155	67.97	32.03
Total Telangana		15	58	12,285	5,603	17,888	68.68	31.32

It may be mentioned here that some of the talukdars have instituted inquiries as regards the proportion the indebtedness of the agriculturists bears to their yearly income.

From the result of these inquiries it may be assumed that, generally speaking, the amount of indebtedness of most of the cultivators does not exceed their income for two years.

The number of those in debt for sums below Rs. 50 is 38.34 per cent. These cultivators are the most indigent and poverty-stricken, and may virtually be regarded as depending upon the saucar even for the bare necessities of life. They are not able to pay their revenue instalments, nor purchase bullocks and other agricultural implements unassisted. It is the saucar who must help them in this respect. They do not strive to find a market where they could sell the produce of their fields with advantage to themselves, but they must needs make over the whole to the saucar at a rate considerably less than the market value of the commodities thus made over. These transactions entail double loss upon the cultivator. In the first place the saucar charges an exorbitant rate of interest, often as much as 24 per cent. per annum, on the loans that he advances.

Secondly, he demands higher prices than what prevail in the market for all commodities that he supplies to the cultivator, and in addition to this he charges interest on these loans. Then again, he purchases from the debtor the produce of his land at considerably lower rates than what rule in the market. It may fairly be said that in this way the saucar can in the course of three years or so double the amount of his principal, and thus he can easily do, without in any way attempting to cheat the cultivator, by the simple process of charging high prices for the commodities he supplies, and accepting at a low valuation all that his debtor makes over to him in repayment of his debt, add to this his high rates of interest and compound interest, and the whole secret of his success is easily understood. Should the saucar, however, be inclined to defraud the cultivator, he has every facility for doing so, and could in the short period of a year double the amount of the loan he advances. Mr. Shapurjee Jevanjee, first talukdar of the Nagur-Kurnul district, in a report submitted by him on the subject, states:—

In their transactions with the money-lender, the cultivators of this district suffer heavy losses. The usual rate of interest charged on sums advanced to well-to-do

cultivators is Rs. 2 per cent. per mensem, and at compound interest this amounts to Rs. 2.9 or even 3 per cent. per mensem. When borrowing grain and other commodities from the saucar, the cultivator has to pay 25 per cent. more than the market value of the commodity. This loan is not repaid in coin, but is returned in kind. If the cultivator borrows paddy seed for sowing his fields during the rains, he has, in repayment, to make over at next harvest double the quantity borrowed. If the seed is required for sowing during the hot season he has to return it at 50 per cent. above the quantity lent. As the saucar generally gets his loans of grain returned to him in about six months' time it may be said that in so short a time he realises a profit of from 50 to 100 per cent. With cultivators who do not enjoy good credit the saucar is still more exorbitant. When he advances loans of grain for consumption he stipulates that the loan will be repaid in grain of a much superior description to that lent. To give an instance in point. In the Devurgarh taluka the staple grain produced is joār or ragi, the area under wheat or rice being very limited. Now when a cultivator borrows a maund of joār or ragi he has to repay this loan by a maund and a half and sometimes two maunds of paddy. In this manner he has in the course of a single year to pay considerably more than double the amount of his original debt. Should the cultivator fail to discharge his debt within one year the grain is valued at a higher rate than what prevails in the market, and interest charged on the sum. When the cultivator borrows money to pay the wages of the labourers he employs he is subjected to extra losses in addition to the interest he has to pay. For instance, when getting his fields weeded the cultivator has to pay his labourers in cash. This money he gets from the saucar. As the cultivator requires copper for distribution the saucar makes advances to him in that coin. The amount of copper that he counts as equivalent to a rupee is less by far than the current rate, and the sum of rupees arrived at according to this calculation is debited to the cultivator's account; the interest of rupees 2 per cent. per mensem is charged on this amount, and when at the commencement of the ensuing season accounts are adjusted grain is accepted in return for the money loan. This grain is again estimated at a lower valuation than the rates obtaining in the market, and settlement of the account is thus finally arrived at. Interest is charged on the amount thus arrived at from the date on which the final adjustment is made.

Instances have been found in which the amount of interest has actually doubled the amount of principal in a single year.

Moulavie Nazir Ahmed, Sader talukdar of the Northern Division, in his report on the indebtedness of the cultivating population, states:—

Taking a general view of the indebtedness of the ryot no satisfactory explanation can be given. The chief incentive to borrowing money is in some cases need, in others habit, and in the rest the ruling desire to hide their prosperity. I know a number of tenants in Telangana who cultivate 10, 15, or even 20 bighas of sugar-cane, a circumstance in itself a criterion of the cultivator's wealth. Notwithstanding this they persistently pretended to have dealings with the saucar, and whenever rent is demanded they refer the matter to the saucar and transfer their liabilities to him. Where the habit of having dealings with the money-lender has become so general and so persistent as almost to constitute one of the conditions of tenancy it is extremely difficult to understand the cause. My own experience goes to show that the number of cultivators indebted as a matter of habit is greater than that of cultivators who have to borrow out of necessity. It might be that the custom of borrowing money had its origin in poverty and want, but has now become a fixed habit of which the cultivators have not the power to divest themselves. Even when they are in a position to employ their own capital they cannot resist the temptation of inviting outside help, just as men of lazy and slothful habits are always loath to use their

own limbs and get others to help them in their needs. CHAP. I. QN. 9. Those that enter into transactions with money-lenders in order to hide their own opulence are not impelled to adopt this expedient from a sense of insecurity, their motive generally is an habitual aversion to hear their wealth made a subject of general remark.

It cannot be denied that the liabilities of the cultivator have increased since the days when the payment in kind system of rent prevailed, and this may be an additional cause of his indebtedness. It often happens that when Government revenue is due, the cultivator cannot conveniently dispose of his produce or there is a tendency in the rates to rise, and he is naturally inclined to hold over his stock in the hope of making larger profits. Under such circumstances he is obliged to have recourse to the money lender. But the thread of debt once woven cannot soon be unwoven again. On the other hand it can be arithmetically proved that the cultivator has gained considerably by the abolition of the batai (payment in kind) system, and there is no reason why he should always remain involved in debt. Suppose, for instance, that a tenant has a bigha of wet land under his tillage. The lowest quantity of rice that might be raised on this land is not less than a khandi and a half, the price of which at the ordinary bazaar rate is Rs. 75. Under the Batai system the Government was entitled to a moiety of the total produce and the cultivator to the other half. Under the existing payment in cash system, the average share of the Government per bigha is Rs. 13, while the balance, Rs. 62, represents the cultivator's share in the produce of his field. In other words, under the latter system the amount of the cultivator's receipts is Rs. 62 instead of Rs. 37.8 under the former. It is now clear that the idea that the existing high rate of assessment is the chief cause of the cultivator's indebtedness, and that leniency in those rates will tend to free him from the saucar's grasp, is utterly unfounded. On the other hand, it is my impression that even if the Government demand were entirely remitted, the saucar would ever be flourishing at the expense of the cultivator, who would never rise much above his present wretched position.

Although the condition of the cultivators of the Mahratta districts is much better than what prevails in the Telangana districts, and although they are not necessitated to borrow to the extent their brethren in the Telangana province are compelled to do, yet on account of their profuse expenditure, they are no better off than their brethren in Telangana, as is forcibly shown by the following quotations from Mr. Furdoonjee's report:—

As has been stated above, the Kunbi cultivator does not rightly appreciate the value of money, and the better his credit the more profuse he is in his expenditure. In prosperous seasons he does not lay by money for years of scarcity. What he gets he generally spends, and leaves the future to take care of itself. During the American war, when the Berar cultivators enriched themselves by growing cotton, a few of the Kunbis made silver ploughshares to till their fields. Most of them spent extravagant sums in the purchase of silk dresses for the women of their families. The acute saucar knows the weak points of the Kunbis, and by freely lending money to the well-to-do, he encourages them in extravagant habits, knowing that he will profit thereby. The saucar understands his own interests.

From these and other considerations, it became evident to his Highness's Government that if the cultivator were not in some measure protected by his landlord the State, he would, by rushing headlong into debt, be completely ruined. It was decided by Government that this protection could be secured by diminishing, not destroying, the credit enjoyed by the cultivators. It was at first feared that by interfering with the freedom of contract the Kunbi would not be able to raise money for the purpose of improving his land, for purchasing cattle and seed, and paying the Government demand. But, on the other hand, it was thought by diminishing the facilities for borrowing,

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the cultivators would be saved from sinking into irretrievable embarrassment, as they are prone to do when they have unlimited credit. Under well-understood regulations, the saucar would himself exercise great caution in advancing loans for marriages, feasts, and other luxuries. And yet if the Kunbi requires a loan to effect any improvements on his land, or to pay the Government demand, or for any other obviously productive or necessary purposes, it would be to the interest of the saucar to make the advance, knowing that in such cases the investment would be safe under certain restrictions. Thus, while the cultivator would find it difficult to raise a loan to squander recklessly, he would always be able to get money for useful and productive works connected with his land. Next came the question as to how the cultivator's credit was to be judiciously restricted. This was effected by the adoption of the following measures, which were embodied in circular orders, and were from time to time issued by the judicial department—

1. No ex-parte decree was to be passed by a civil court against any debtor, until the creditor should have proved, by his books or otherwise, to the satisfaction of the court, that the bond was executed for veritable and fair consideration.

2. If a usurious rate of interest had been charged, it was to be reduced to a reasonable rate. When the amount of interest did not exceed the amount of the principal, the rate of interest entered in the bond could be adhered to, but when the amount of interest did exceed the principal, the Hindu law of *Dām dupat* was to be enforced. Of however long standing the debt might be, the amount of interest given by decree was never to exceed the amount of principal.

3. When the cultivator was unable to pay at once the amount of the decree passed against him, the court could order it to be paid by reasonable instalments. If the circumstances of the case warranted interest being allowed to run on the decree, 1 per cent. per annum only was to be allowed, until the debt was liquidated.

4. When attachment was issued against a cultivator's property, his house, his agricultural implements, his cattle, and a supply of grain, enough to support him and his family till next harvest, were to be exempted from execution.

5. No judgment-debtor was to be imprisoned for debt, unless suspected of having concealed his property to evade payment.

So far as can be ascertained, these measures are judicious, and seem to work satisfactorily. We shall now give a brief account of the different terms on which a cultivator may borrow money from a money-lender.

* * * * *

Where a cultivator is well off, he does not take petty loans, but borrows a lump sum from the saucar, for the payment of Government assessment, or for any other purpose, and the interest to a borrower enjoying good credit does not usually exceed one per cent. per mensem. The cultivator agrees to repay the loan at the next rabi or kharif harvest, but the agreement is generally verbal, and not written. If, at the time of harvest, the cultivator sees that the prevailing prices of grain are low, and if he thinks that there is a prospect of obtaining better prices further on, he reserves his stock of grain until such time, and asks the saucar to let the loan stand over till then. Where the cultivator's credit does not stand very high, he has generally to pay more interest, say about Rs. 1.8.0 per cent. per mensem. When one of this class resorts to a saucar, he has, in the first instance, to pass a bond, but when he becomes known to the money-lender this formality is no longer necessary. Very frequently the saucar takes payment in grain, which is sold to him at the market rate, the only difference being that, in weighing, about four or five seers (8 or 10 lbs.) is added to a pulla (240 lbs.) as kussur. Cultivators of this class do not generally borrow anything under Rs. 10; nor do they, as a rule, borrow seed grain or grain for consumption from the saucar.

If a cultivator does not enjoy good credit, the saucar lends him money on any of the four following terms:—

1. *On interest and compound interest.*—The borrower passes a bond to the saucar, say, for Rs. 100. For this he receives Rs. 98 in cash, Rs. 2 being deducted as munnoti by the saucar. The cultivator agrees to pay interest at a rate which varies from Rs. 1.8 to Rs. 2 per mensem, and to repay the advance at the next kharif or rabi harvest. If he fails to do this and defers payment till the subsequent harvest, compound interest is charged. The saucar, after getting the bond executed, does not pay down the amount in a lump sum, but lets the cultivator have it in sums sufficient to pay the Government assessment, or to buy cattle, &c. The saucar frequently pays the Government assessment direct to the patel and patwadi in Halli Sicca rupees, but he recovers the amount from the cultivator in British rupees, making a profit of one or two per cent. in the rate of exchange.

2. *Batta Mubadla.**—The saucar pays the Government assessment direct to the patel and patwadi in Halli Sicca rupees, and recovers from the cultivator at harvest time the same amount in British rupees. The profit he makes in the difference between the value of Halli Sicca and British rupees is not inconsiderable, because the rate of exchange varies from Rs. 14 to Rs. 22, and the period of the loan seldom or never exceeds three months. If the loan is not repaid at harvest time, interest at one or one and a half per cent. is allowed to run on the sum till it is repaid at next harvest.

Rāgwaddā or Lāoni.—The cultivator raises a loan, passing a written agreement to repay it from the produce of his fields. The saucar forms an estimate of what would be the probable ruling prices at harvest time, and, leaving a margin of 10 or 15 per cent. profit, agrees to purchase the crops at certain prices fixed between them. This contract is generally entered into four or five months before harvest time. If prices fluctuate meanwhile, either the saucar or the cultivator loses, but the former is generally the gainer by this transaction. If the cultivator fails to make over the grain at the allotted time, according to one of the terms of the contract, he has to give the saucar, in the year following, 25 or 50 per cent. over and above the quantity of grain originally agreed upon.

Suvvā.—The cultivator raises a loan, promising to repay it within a year by two instalments, the first falling due on the kharif, and the second on the rabi harvest. The bond is executed for a sum of 25 per cent. over and above the amount actually paid; this is equivalent to a rate of about two per cent. interest per mensem. Besides this, when paying the cash down, the saucar deducts two per cent. as munnoti.

One of the terms of the agreement is that, if the amount of the bond is not repaid within the times specified, interest at the rate of about one or two per cent. per mensem is to run on until such time as the loan is repaid.

It may be mentioned here that in bonds of this sort the cultivator mortgages to the saucar the produce of his fields, his cattle and house. Sometimes the fields themselves are mortgaged. It need not be stated that the property so mortgaged remains in possession of the owner, the saucar merely keeping an eye on him to see that he does not dispose of it in any way.

Besides loans in cash, some of the cultivators take loans in seed-grain, on condition that it is to be returned at harvest with 50 per cent. over and above the quantity lent; but if the loan is made at a time when the prices are high, the quantity is doubled. In transactions of this nature, written agreements are seldom entered into, the cultivator considering it a religious debt, which he is anxious to pay at the first opportunity. Hence, suits for transactions of this nature seldom or never come into civil courts.

* Under transactions with this designation, the conditions are similar to those given above.

When a cultivator raises a loan in grain for home consumption, he has it on condition of returning the loan at 25 or 50, and in seasons of scarcity at 100 per cent. over and above the quantity lent. A bond is generally passed for this loan. The borrower does not carry away from the saucar the whole amount of the grain at once, but receives it in such quantities as may be required. If unable to return the loan at the time agreed upon, the debtor is allowed to repay it at next harvest, with 50 per cent. over and above the total quantity due.

Note by Mahadeo Wasudeo Barve, one of the members of the Famine Commission, on the experience acquired by him during a tour in Central India.

From my inquiries into the condition of the ryots in four Native States, viz., Jaipur, Oojein, Indore, and Hyderabad, which may be taken fairly to represent their class, it appears that the rate of assessment is invariably higher than in British territory; that the cultivators there are as deeply involved in debt as here, if not more so; that the living and the status of the cultivator is in no way better in the Native States; and that, in short, it can by no means be said that a cultivator living under a native rule fares better than his compeer in British dominion. The glowing colours in which the fate of the British tiller of land is sometimes bemoaned, and that of the cultivator in the Native States extolled, by many, vanish before the observation of actual facts. The paucity of reliable information available on the subject has afforded those visionaries an opportunity to palm on the public, without a fear of contradiction, certain products of their imagination as undisputed facts. My own observation has led me to believe that our cultivator enjoys certain advantages over one under native rule; and that an exposure in its nakedness of condition of the latter will not fail to open the eyes of the former to the superiority of his lot.

As observed above, there is an essential difference between the systems of realising assessment obtaining in the Bombay Presidency and in the Native States. In the ryotwari system that prevails to a very great extent with us, the ryot is directly responsible to Government for the assessment due from him. There is in Native States, on the other hand, always a middle-man in the farmer of the revenue of the village. So far as the pressure of the assessment on the ryot is concerned, the above-mentioned difference in the mode of the realisation of revenue is of no consequence; inasmuch as it is immaterial whether a certain demand is made by the Government direct or through the medium of another individual, so long as that demand remains unaltered. It is indeed said that the Government mode of realising revenue, viz., that of distress and sale, is stringent and not accommodating to the different mishaps to which a cultivator's calculations are frequently liable. But there appears to me no ground to expect greater leniency from a private farmer, who has only a temporary interest in the prosperity of the peasantry, than from Government, whose interests are indissolubly wound up with those of the subjects. The respite in payment that he occasionally allows to disabled ryots is deemed by those ignorant people a great boon; but they hardly know at what price that is purchased in the shape of interest paid for arrears.

The absence of anything like alienable interest in the land operates in the case of the cultivators in a Native State to make their condition much worse than that of their brethren in British India. The social status of a man varies directly as his credit; and all circumstances combine to reduce this credit to a minimum when a peasant can neither sell, mortgage, nor otherwise alienate his holding. The necessary result of such absence of credit is the difficulty of obtaining loans without stringent terms. The British ryot, on the other hand, has a tangible interest in his holding, which can serve as good security to the creditor, and which therefore helps him to borrow on compara-

When a cultivator breaks down, and is unable for a period of four or five years to repay his saucar's debts, his accounts are made up, and a settlement is generally effected in this way. The cultivator enters into an agreement, by which he binds himself to till, for a certain number of years, a certain portion of his holding, and after sowing it at his own cost to make over the field to the saucar, who takes charge of it, and reaps the crops when it is ready. And so, at a little cost, the saucar gets a part of the produce of the cultivator's fields, and is thus enabled to recover what would have been a bad debt.

tively moderate terms. The estate of the ryot in the land is indeed of an inferior kind, and terminable at the end of a certain period; but this interest, limited as it is, satisfies the requirements of a wary money-lender, because it is certain. The British ryot thus enjoys a privilege which is denied even to inamdars in Native States. The practice in Native States of annually farming revenue is again detrimental to the investment of capital in land on the part of the cultivators, while there is a direct incentive thereto in British territory, owing to the 30 years' tenure guaranteed by the Revenue Survey settlement, being long enough to secure to the cultivating capitalist a fair return for his outlay. It is indeed true that the assessment is not practically subject to frequent revisions in Native States; but this circumstance does not count for much in the calculations of the cultivator because the freedom from revision is not guaranteed, and cannot be depended on.

It cannot be, however, denied that the Native States hold out one advantage which the British cultivator does not enjoy. While the ryot here is made to pay his fixed assessment due on his registered holding, irrespectively of the actual cultivation, the Native States levy assessment only on the land actually cultivated. This appears to be fair, for land will never be thrown up until it ceases to yield a fair crop; and it is harsh if, owing to the diminished productive capacity of the land, or the absence of capital, a cultivator should have to leave his holding fallow, that he should have his difficulties enhanced by having to pay assessment without reaping any harvest in compensation.

A word here about the origin of the indebtedness of ryots will not be out of place. Anything like an exhaustive inquiry of this matter is impossible within the short limits of a minute of this kind. But it may be said, in brief, that I believe those who have searched for the poverty and indebtedness in the different revenue administrations have busied themselves only with the surface, and have left the interior unexplored. Experience shows that, among all the multifarious tenures obtaining in different parts of India, not one can be named which pre-eminently guards against the ryot's indebtedness. The conclusion follows that the source of that mischief does not lie in the nature of the tenures. It is my idea that the present revenue system, viewed as a whole, is fair both to Government and the ryots, and that therefore the origin of the existing evils must be sought elsewhere. It appears to me that it is the wide gulf in point of intelligence which separates the Indian cultivator from the other classes of the society that is the source of the vast disparity in their status. The same law by which the whole lower creation is made subservient to the will of man operates in the case of transactions between man and man; and it cannot be but that one more intelligent must prey on another less gifted. The absorption of the gains of the cultivators by the higher classes in this country, therefore, is no strange phenomenon, and is only an illustration of the said law. If this notion of mine is correct, it follows that the remedy to be applied must be such as raises the cultivator in the scale of intelligence, so as to enable him to utilise the powers of nature, and guard against

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CHAP. I. QN. 9. the rapacity of his neighbour. This done, I am sanguine the ryot will prosper, even under the present much traduced revenue system.

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Some suitable remedy for ameliorating the condition of the Indian peasantry, by means of fresh legislation or otherwise, is being devised by the statesmen of the

day; and I hope their benevolent efforts will end in such a way as would afford a suitable relief to the poverty-stricken and heavily indebted land cultivating ryots, without interfering much with the class of money-lenders, who form no doubt a necessary element of the society.

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PUNJAB.

Major Wace.

CHAPTER I.—QUESTION 10.

Describe the tenures of land (proprietary and occupancy) which are most common, and as nearly as you can the area of cultivated land held by each kind of tenure. How far does the character of the tenure appear to affect the economic condition of the person holding it? Are there any conditions of tenure (such, for instance, as unrestricted freedom of transfer) which might be changed with advantage to the holder and without injury to other parties?

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I append the latest statistics of land tenures in the Punjab. They are the returns on the subject furnished with the annual Revenue Report for 1875-76, and consist of two statements. The first shows the tenures held direct from Government, that is to say, the proprietary tenures, and also leases of Government lands; the second shows the tenures not held direct from Government, that is to say, tenancies of all descriptions held under proprietors.

Proprietary tenures.—Of the proprietary tenures, I extract the following description from the Punjab Administration Report for 1872-73, a description of which Mr. G. D. Barkley, one of the senior members of the Punjab civil service, is the author:—

Taking the Province as a whole, it may be estimated that between one-fifth and one-sixth of the area is the property of Government; while upwards of four fifths belongs to private owners.* The greater part of the area belonging to Government is, however, little better than a desert, and could not profitably be brought under cultivation without the aid of extensive works of irrigation. Some of the more favourably situated portions are preserved as forest or grazing lands, and others are held under lease from Government for purposes of cultivation; but almost the entire cultivated area of the Province is included in the lands of private owners.

These lands are held subject to the payment of land revenue to the State, or grantees holding from the State; and this revenue at present exceeds Rs. 2,20,00,000 per annum, of which more than Rs. 32,00,000 are received by assignees who had, on various grounds, claims to consideration from Government. In some cases these assignments are of the nature of the release of the revenue of lands belonging to the assignees, but they have no necessary connexion with proprietary right, and in the majority of instances the grantees are merely entitled to receive the revenue payable to Government, the amount of which is limited in the same way as if it were paid direct to Government.

The great mass of the landed property in the Punjab is held by small proprietors, who cultivate their own land in whole or in part. The chief characteristic of the tenure generally is that these proprietors are associated together in village communities, having to a greater or less extent joint interests, and, under

our system of cash payments, limited so as to secure a certain profit to the proprietors, jointly responsible for the payment of the revenue assessed upon the village lands. It is almost an invariable incident of the tenure, that if any of the proprietors wishes to sell his rights, or is obliged to part with them in order to satisfy demands upon him, the other members of the same community have a preferential right to purchase them at the same price as could be obtained from outsiders.

In some cases (technically known as Zamindari tenures) all the proprietors have an undivided interest in all the land belonging to the proprietary community,—in other words, all the land is in common; and what the proprietors themselves cultivate is held by them as tenants of the community. Their rights are regulated by their shares in the estate, both as regards the extent of the holdings they are entitled to cultivate, and as regards the distribution of profits; and if the profits from land held by non-proprietary cultivators are not sufficient to pay the revenue and other charges, the balance would ordinarily be collected from the proprietors according to the same shares.

It is, however, much more common for the proprietors to have their own separate holdings in the estate, and this separation may extend so far that there is no land susceptible of separate appropriation which is not the separate property of an individual or family. In an extreme case like this, the right of pre-emption and the joint responsibility for the revenue, in case any of the individual proprietors should fail to meet the demand upon him, are almost the only ties which bind the community together. The separation, however, generally does not go so far. Often all the cultivated land is held in separate ownership, while the pasture, ponds or tanks, &c., remain in common; in other cases the land cultivated by tenants is the common property of the community; and it frequently happens that the village contains several well-known sub-divisions, each with its own separate land, the whole of which may be held in common by the proprietors of the sub-division, or the whole may be held in severalty, or part in separate ownership and part in common.

In those communities (technically known as bhyachara and pattidari) with partial or entire separation of proprietary title the measure of the rights and liabilities of the proprietors varies very much. It sometimes depends solely upon original acquisition and the operation of the laws of inheritance; in other cases definite shares in the land of a village or sub-division different from those which would result from the law of inheritance have been established by cus-

tom; in other cases reference is made not to shares in the land, but to shares in a well or other source of irrigation; and there are many cases in which no specified shares are acknowledged, but the area in the separate possession of each proprietor is the sole measure of his interest. It is sometimes the case, however, that while the separate holdings do not correspond with any recognised shares, such shares will be regarded in dividing the profits of common land, or in the partition of such land; and wells are generally held according to shares, even where the title to the land depends exclusively on undisturbed possession.

In some cases the separate holdings are not permanent in their character, a custom existing by which the lands separately held can be redistributed in order to redress inequalities which have grown up since the original division. Between the Indus and the Jumna this custom is rare, and is probably almost entirely confined to river villages, which are liable to suffer greatly from diluvion, and have little common land available for proprietors whose separate holdings are swept away. Even in river villages, it is often the rule that the proprietor whose lands are swept away can claim nothing but to be relieved of his share of the liabilities of the village for revenue and other charges.

Trans-Indus, however, in the tracts of country inhabited chiefly by a Pathan population, periodical redistribution of holdings was by no means uncommon, and the same is stated to have been formerly the case in some of the villages of the Pathan ilaka of Chach, Cis-Indus, in the Rawalpindi district. The remarkable feature in the redistributions Trans-Indus was that they were no mere adjustments of possession according to shares, but complete exchanges of property between one group of proprietors and another, followed by division among the proprietors of each group. Nor were they always confined to the proprietors of a single village. The tribe, and not the village, was in many cases the true proprietary unit, and the exchange was effected at intervals of 3, 5, 7, 10, 15, or 30 years between the proprietors residing in one village and those of a neighbouring village. In some cases the land only was exchanged; in others the exchange extended to the houses as well as the land. Since the country came under British rule, every opportunity has been taken to get rid of these periodical exchanges on a large scale by substituting final partitions, or adjusting the revenue demand according to the value of the lands actually held by each village; but the custom is in a few cases still acted upon amongst the proprietors of the same village, though probably no cases remain in which it would be enforced between the proprietors of distinct villages.

Throughout the greater part of the Province the organisation of the proprietors of land into village communities has existed from time immemorial, and is the work of the people themselves, and not the result of measures adopted either by our own or by previous Governments. Indeed these communities have sometimes been strong enough to resist the payment of revenue to the Government of the day, and before our rule nothing was more common than for them to decide their disputes by petty wars against each other, instead of having recourse to any superior authority to settle them. But in some localities the present communities have been constituted from motives of convenience in the application of our system of settlement. Thus in the Simla hills and in the more mountainous portions of the Kangra district the present village communities consist of numerous small hamlets, each with its own group of fields and separate lands, and which had no bond of union until they were united for administrative purposes at the time of the Land Revenue Settlement. In the Mooltan division, again, while regular village communities were frequently found in the fertile lands fringing the rivers, all trace of these disappeared where the culti-

vation was dependant on scattered wells beyond the influence of the river. Here the well was the true unit of property; but where the proprietors of several wells lived together for mutual protection, or their wells were sufficiently near to be conveniently included within one village boundary, the opportunity was taken to group them into village communities. The same course has been followed in some parts of the Derajat division, where small separate properties readily admitting of union were found. These arrangements were made possible by the circumstance that the village community system admits of any amount of separation of the property of the individual proprietors, and, by care being taken that in the internal distribution of the revenue demand it should be duly adjusted with reference to the resources of the separate holdings. They also in general involved making over in joint ownership to the proprietors the separate holdings of waste land situate within the new boundary, in which no private property had previously existed.

In some cases the village communities, while holding and managing the land as proprietors, are bound to pay a quit-rent to superior proprietors under whom they hold. The settlement is made according to circumstances, either with the superior proprietor who collects the Government revenue as well as his quit-rent from the communities, or with the communities in actual possession of the land, who pay the land revenue to Government, and the quit-rent to the superior proprietor. In either case, the amount which the superior proprietor is entitled to collect is determined at settlement as well as the amount of the land revenue demand.

There are sometimes also proprietors holding lands within the estates of village communities, but who are not members of the communities, and are not entitled to share in the common profit, nor liable for anything more than the revenue of their own lands, the village charges ordinarily paid by proprietors, and the quit-rent, if any, payable to the proprietary body of the village. The most common examples of this class are the holders of plots at present or formerly revenue free, in which the assignees were allowed to get proprietary possession in consequence of having planted gardens or made other improvements, or because they had other claims to consideration on the part of the village community. In the Rawalpindi division also it was thought proper to record old-established tenants, who had never paid anything for the land they held but their proportion of the land revenue and village expenses, and had long paid direct to the collectors of the revenue, but were not descended from the original proprietary body, as owners of their own holdings, while not participating in the common rights and liabilities of the proprietary community. Except in the Jhelum and Rawalpindi districts, where a small quit-rent was imposed, these inferior proprietors were not required to pay anything in excess of their proportion of the Government revenue and other village charges. In Gujrat, at the time of the first regular settlement, this class held no less than 10 per cent. of the total cultivated area, and in Rawalpindi it paid nine per cent. of the revenue. In Rawalpindi the persons recorded as proprietors of their own holdings only were in some cases the representatives of the original proprietary body, jagirdars having established proprietary rights over what were formerly the common lands of the village.

In Mooltan and Muzaffargarh, and perhaps in some other districts in the south of the Punjab, a class of proprietors distinct from the owners of the land is found under the name of Chakdars, Sililandars, or Kasurkhwars. These are the owners of wells, or occasionally of irrigation channels, constructed at their expense in land belonging to others. They possess hereditary and transferable rights, both in the well or irrigation channel and in the cultivation of the land irrigated from it, but may be bought out by the proprietor repaying the capital they have expended.

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* It is necessary to observe that the number of holders or shareholders shown in the returns is rather the number of separate holdings and shares in such holdings than of proprietors,—a person who has two distinct holdings, or shares in such holdings, being counted twice over. Thus in Kangra, with a total population of 743,882, of whom 527,086 are agriculturists, 276,245 proprietors and 34,898 tenants are returned.

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They are generally entitled to arrange for the cultivation, paying a small fixed proportion of the produce to the proprietor, and being responsible for the Government revenue. Sometimes, however, the management of the property has been made over to the proprietor, who pays the Government revenue, and the Chakdār receives from him a fixed proportion of the produce called *hak kasūr*. Or a third party may manage the property, paying the Government revenue and the *hak kasūr*, out of which the Chakdār pays the proprietor's allowance.

In Rawalpindi also there is a small class of well-proprietors in the position of middle men, paying cash rent to the owner of the land and receiving a grain rent from the cultivator.

Thus far Mr. Barkley's description of the tenures. In proceeding to summarise the statistics of the extent of each tenure, contained in the returns appended, I shall endeavour to avoid repeating the remarks with which they are prefaced.

Unassigned Government Waste.—The area thus returned is 15,964 square miles; but there are two large errors. The portion of the hill waste of the Rawalpindi district belonging to Government is over-estimated by about 1,500 square miles; and that which belongs to Government in the Jhelum district, some 555 square miles, is wrongly returned as held by lessees, instead of being shown under this head. Allowing for these corrections, the result still is, that the right to the soil in nearly one-sixth of the Province, or about 14,900 square miles, vests solely in Government. Of this, the Hazāra hill forests contribute 240 square miles; the hill wastes of the Rawalpindi district 800 (I fear this is still an over-estimate); those of the Jhelum and Shahpur hill wastes 700. The rest, some 13,000 square miles, consists of the waste Bār lands between the Sutlej and the Indus, and are situate almost entirely in the Mooltan and Derajāt divisions, and in the districts of Shahpur and Gujranwāla. This area in its present state is sparsely covered with stunted trees and bushes, and in ordinary years large tracts in it bear a good deal of nutritious grass during the autumn rains. Large numbers of camels and kine are consequently grazed on these waste lands. But it is in truth little better than a desert, and must remain so till irrigated by canals. For such extension these wastes offer great facilities; the soil is fertile, there are no engineering difficulties to contend with; and the Indus, Jhelum, and Chenab rivers contain an exhaustless supply of water fed from the snows of the Himalayas. In short these extensive wastes are of limited present value, but probably of great prospective value.

Grantees and lessees of the British Government.—These tenures are over-stated in the returns. For instance, in the Jhelum district, as above noticed, all the hill preserves (*rakhs*) seem to have been so returned, because the grazing was leased out annually; and it is probable that similar errors have occurred in other districts. But at the outside these tenures, enjoyed by 24,000 persons, cover only 1,400,000 acres, or less than 3 per cent. of the total agricultural holdings. Of these, the area held by lessees (*i.e.*, persons to whom the right of ownership has not yet been alienated) is at least three-fourths of the whole. For in making grants of waste land, it is usual to give in the first instance only a lease for a term of years (usually 20); and at the expiration of the lease, if the lessee has used the land well, it is granted to him in proprietary right or sold to him at a fair valuation. This course is followed to prevent speculative purchases of waste land by persons who lack the capital or enterprise to put them to a profitable use. Lands so leased and sold are subject to the same revenue and police responsibilities as apply to the older settled lands.

Landholders who have redeemed the revenue.—These number 595 with 51,001 acres. No such redemption is now permitted.

Zamindari Estates.—These, it will be observed, cover but a small portion of the area of the Province. The return draws a distinction between the larger estates in which the owners are mainly rent receivers, tenants cultivating under them; and those in which the owners are also for the most part the cultivators. Omitting the latter, and also the great estate (776,960 acres) of the Khattak chief in the Kohāt district, there remain of the total agricultural tenures only 1,914,034 acres, or 3½ per cent., in which the coparcenary owners of the villages are not also the principal cultivators.

Proprietary cultivating communities.—These in one or other of the several forms noted in the return (*i.e.* holding and paying revenue on an undivided tenure, or having their holdings divided) make up the great majority of the tenures. The various methods, by which the relations of the members of these communities to each other are regulated, are of little importance for the purposes of the present inquiry. Thus, where a cultivating community is said to hold its lands in common, this only means that the right of ownership is joint, and as a matter of fact the extent of land cultivated by each member is not usually very disproportionate to his proprietary share in the estate. Or, to take the much more numerous instances, in which the majority of the holdings which make up the community are separate, the economic condition of the holders depends principally on the size of the holding. Whether its relations to the rest of the community can be described in a stated share, or merely by the proportion which its area happens to bear to the whole, is an accident of the tenure which possesses an important bearing on the revenue assessment of the holding, and on its share in the village common and village management; but what really makes the holder well off, or the contrary, is the size of the holding and the relation which its profits bear to his expenses. So, neglecting all details of tenure, we can confine our attention to the total area owned by these cultivating communities. The total area is about 92 per cent. of the entire agricultural tenures.

The area per holder or shareholder is according to these returns 20 acres; but this requires explanation and modification. It includes both cultivated and waste land. Also, as stated above in a foot-note, where a man holds two distinct holdings or shares in two holdings, he has been counted twice over. It is consequently not possible to give from these returns the average area held by each agriculturist, nor to state how much thereof is cultivated. This point belongs rather to question 9; and I trust that it has been sufficiently answered therein.

Tenancies.—When I spoke above of 92 per cent. of the agricultural tenures being owned by cultivating communities, I did not mean that none of their lands are tilled by tenants, but only that the greater part were cultivated by the proprietors themselves. I now proceed to show the proportion cultivated by owners and by tenants respectively in the whole Province.

The second of the statements appended gives the area of the tenancies. This area may include a small amount of waste; but tenants usually have the use of the common waste, and their holdings consequently include little except cultivated land. The total area held by tenants is returned as 10,108,745 acres; which is 44 per cent. of the total cultivated area of the year in which the returns were prepared. But before arriving at the true area cultivated by the tenant class, some deduction has to be made from this figure. A proprietor who cultivates a portion of his neighbour's holding in the capacity of the tenant is necessarily so returned; and similarly, if he cultivates part of the common lands, he does so as a tenant. Consequently the true area of the cultivation of the tenant class, strictly so defined, is less than 44 per cent. On the whole I think it may be asserted with safety that proprietors cultivate 60 per cent., and tenants 40 per cent. of the total area under the plough.

The proportions in each division reckoned without any such rectification strictly on the figures of the return appended, compared with the cultivation returns of the same year, are:—

Division.	Per cent. of cultivated area cultivated by	
	Owners.	Tenants.
Delhi	66	34
Hissar	45	55
Umberla	77	23
Jullundur	69	31
Amritsar	59	41
Lahore	61	39
Rawalpindi	60	40
Mooltan*	34	66
Derajāt	54	46
Peshawar	52	48

It remains to indicate the character of the tenancies. A third of the whole tenant cultivation is held by 512,070 holdings with right of occupancy. On two thirds of this area the rents are paid in cash; on the rest the rents are fixed at a share of the produce, which varies, according to locality, from a fifth to a half. The average size of these tenancies with right of occupancy is 6½ acres; the holdings paying cash rents average nearly 6 acres, those paying rent by a share in the produce average 8 acres.

Only 1 per cent. of the whole tenancies are held on written leases.

Tenants-at-will, whose holdings number 1,096,595, cultivate of the whole tenancies a fraction less than two-thirds, *viz.*, 6,488,313 acres. Of this area 43 per cent. pay cash rents, the holdings averaging 5 acres; 27 per cent. pay rents of half produce, the holdings averaging 6 acres; and 30 per cent. pay produce rents pitched at a smaller share than half, the holdings averaging 8½ acres.

The figures of the return give 6 acres as the average size of tenancies of all descriptions. This is not of itself equivalent to saying that a tenant on the average cultivates 6 acres. For in the return one man who holds tenancies under two separate owners would necessarily be counted twice, for he has two distinct tenancies; and, on the other hand, two brothers jointly holding one tenancy, are shown as only one holding. Setting off these two elements of error against each other, we may, I think, accept the result shown in the return, and say that on the average of all classes of tenants the holding is usually 6 acres.

The tenant with right of occupancy cannot be ousted, except by decree of the civil court passed consequent on the failure of the tenant to satisfy promptly a decree for arrears of rent. But if he himself voluntarily deserts his holding, his right of occupancy at once fails.

The tenant-at-will cannot be ousted except at the close of the agricultural year. He is in fact a tenant from year to year; and if he is not served with notice of ouster in due time before the commencement of the agricultural year, he is entitled to hold on for another year.

No useful purpose would be served by my detailing the grounds on which the occupancy rights of tenants have been awarded in the settlement and civil courts. They have not been created by us on abstract grounds of policy, but are the judicial and legislative interpretation of the privileges, which the older tenants possessed in the times immediately antecedent to our rule; an interpretation no doubt open to argument, but none the less the one arrived at by the majority of our revenue officers and judges whose duty it was to decide the matter, who had the best opportunities for doing

* Excluding the Jhang district, of which the figures seem to be wrong.

so, and whose decision has been finally accepted by the Legislature.

The possession of such a right of occupancy has two principal results:—(1) it protects the tenant from ouster; and (2) it protects him from excessive enhancement of rent. A tenant cannot claim a reduction of rent on the ground of his occupancy; but if the owner sues to enhance his rent, the tenant's occupancy right prevents its enhancement to the level paid by tenants-at-will, according to a scale laid down in the Punjab Tenancy Act. The protection thus afforded varies from 50 to 15 per cent. of the full rent, but is only 15 per cent. in the great majority of cases.

How far does the character of the tenure appear to affect the economic condition of the person holding it?

This amounts to an inquiry how far the occupancy tenants are worse off than the owners, and the tenants-at-will than the occupancy tenants. It has to a considerable extent been answered in the replies to question 9. It is obvious and easy to reply that the size of the holdings being equal, in the long run the tenant-at-will must be worse off than the tenant with an occupancy right, and the owner better off than either. But, as a matter of fact, the differences are frequently not so great as we should *prima facie* expect.

For instance, the appended tenure returns show that of 3,382,598 acres cultivated by occupancy tenants, 1,364,674 acres pay no higher rent than the revenue demand, or that demand plus a small cash seignorage (*Malikāna*—generally 2 or 3 annas per rupee of revenue).

Again, among these tenants are some of the best and most industrious of the agriculturists.

The truth is, that the character of the tenure, though clearly the most important influence, is not the only effective influence in determining the condition of the tenure holder. Besides the influences of industry and character, a very strong influence is attributable to the past history of the country under previous native governments. Revenue and rent were identical terms; the Government usually, and so far as was practicable, levied the whole rent, and dealt directly with every cultivator, ignoring proprietary privileges. These governments have passed away, but the conceptions which they created in the minds of the agriculturists are of very old standing, and change more slowly. We thus constantly find that where the tenants are a settled body of some standing, whether possessing an occupancy right or not, there is not that sharply defined difference between their welfare and that of the village proprietor which the difference of tenure would lead us to expect. No doubt the owners are rapidly realising the power which our law gives them over their tenants, especially that of enhancing rents. Besides this, our rule has greatly enhanced the power of the owner to borrow money on the security of his holding (a power which existed only to a much more limited extent under native rule); and though the tenant also can now get a larger credit than in former days, still, as compared with the owner, he stands at a great disadvantage in this respect.

Perhaps the incident which of all others gives the strongest effect to the difference between the owner's and tenant's status is the payment of rent by a share of the produce. Such produce rents are usually confined to the division of the grain, but extend occasionally even to the division of the straw. And they almost invariably reduce the tenants who pay them to an economic condition very much below that of adjacent owners with holdings of a similar size, and also distinctly below that of similar tenants paying cash rents. On fertile lands the liability to such rents is often contested by the tenants with periodically recurring bitterness. On dry lands, with uncertain crops, produce rents are not unfrequently preferred. The relative prevalence of cash and kind rents in each division is:—

Division.	Land cultivated by tenants who pay rents.		Land held by tenants on lease or on other special terms.	Total land cultivated by tenants.
	In kind by a share of the produce.	In Cash.		
Delhi -	79,764	6,19,841	38,218	7,37,823
Hissar -	1,97,883	15,49,086	41,428	17,88,397
Umballa -	1,09,527	1,88,695	5,668	3,93,890
Jullundur -	2,55,831	3,37,656	31,255	6,27,742
Amritsar -	4,23,749	5,77,989	19,247	10,20,985
Lahore -	3,87,430	7,04,250	39,663	11,31,342
Rawalpindi -	6,02,462	4,78,676	4,735	11,75,873
Mooltan* -	8,26,201	92,031	33,589	9,51,824
Derajat -	8,47,267	69,508	8,208	9,24,983
Peshawar -	2,59,397	3,26,121	1,12,818	6,98,336
Total -	4,169,511	4,943,856	337,828	9,451,195

Are there any conditions of tenure (such, for instance, as unrestricted freedom of transfer) which might be changed with advantage to the holder and without injury to other parties?

In the Punjab there are not. The freedom of transfer which the landowner possesses is materially restricted both (1) by law, and (2) by social feeling.

(1.) Testamentary dispositions of property are almost unknown; and property devolves almost universally by equal division among sons. In respect of transfers *inter vivos*, the law of pre-emption is a powerful obstacle to careless alienations. In the vast majority of transfers this right is not asserted; and a man selling under sufficient necessity and for just purposes is practically little troubled with the claims of pre-emptors. But a spendthrift, or a man acting in opposition to the feeling of the proprietary community of which he is a member, is nearly certain to find an ill-considered sale met by assertions of the right of pre-emption on the part of his village coparceners; the result being that he may succeed in parting with his land, but he will part with it not to strangers, but to other members of the same community. Occupancy tenants of the most privileged classes are permitted by the Tenancy Act (sec. 34) to sell their right of occupancy, provided local custom (sec. 2 of the Act) does not distinctly deny them this power; but they must in every case first offer their right at a fair price to the landowner. The landowner's feelings are usually strongly opposed to such sales; which are consequently few in number.

(2.) The influence of social feeling in restricting transfers is even stronger than the laws above described. It is universally esteemed utter disgrace to a man to part with his ancestral land; and, constituted as their society is, such a man has little or no chance of substituting any respectable calling for his ancestral livelihood. So that landholders throughout the Province will endure all possible straits before finally parting with their heritage.

Some further remarks on this subject will be found in the reply to question 14 of this chapter.

* The figures of the Jhang district have been omitted, as they seem to be wrong.

Statistics of Land Tenures in the Punjab.

The following is a summary of the tenures:—

Superior Tenures.	Number.	Area in acres.
Zamindari estates held by individuals or families -	1,695	26,90,994
Village communities paying in common -	3,392	27,78,920
Village communities divided upon ancestral or customary shares subject to the law of inheritance -	4,088	46,00,559
Village communities in which possession is the measure of the right in all lands -	8,568	1,50,36,578
Village communities in which the lands are held partly in severalty and partly in common -	16,972	2,58,61,787
Grantees or lessees of British Government -	1,584	17,72,342
Landholders who have redeemed the revenue -	63	51,001
Purchasers of Government waste land -	64	17,078
Government waste unassigned -	—	1,02,16,872
Total -	37,659	63,026,126

Inferior Tenures.	Number.	Average area of holding.
With right of occupancy paying rent in cash at different amounts (a detail of which will be found in the statement) -	3,69,849	A. R. P. 5 3 13
Ditto ditto, paying rent in kind -	1,42,221	8 1 4
Tenants holding conditionally -	28,417	6 2 17
Tenants-at-will { Paying in cash -	5,70,352	5 4 10
{ Paying in kind -	5,26,238	7 0 5
Holders of service grants cultivating the land so held -	40,409	1 3 2
Total -	1,677,486	6 0 4

The following general facts may be deduced from this statement. Of the total area of the Province, 16 per cent., and of the cultivated area, 44 per cent., is held by tenants. This fully bears out the statement which has often been made that the land is held largely by cultivating proprietors. This is a point which greatly affects all questions of revenue administration, and cannot be too prominently noticed. The number of tenants with right of occupancy amount to 30 per cent. of the total number. The majority (about 72 per cent.) of tenants with right of occupancy pay rent in cash; 52 per cent. of tenants-at-will pay cash rents. The average area of holdings of tenants who pay in cash is a little more than 5 acres; that of tenants paying rent in kind is larger.

STATEMENT OF TENURES not held direct from Government.

1.	2.	3.	4.	5.	6.	7.
Nature of Tenure.	Number of holdings.	Area of land held.	Average area of holding.	Average cash rent of each holding.	Average rent per acre.	REMARKS.
Grand Total.						
I.—Tenants with right of occupancy.			A. R. P.	RS. A. P.	RS. A. P.	The figures in columns 2 to 6 are for 31 districts only, i.e., excluding Muzaffargarh, for which no details have been given.
(1.) Paying only the amount of the Government revenue to the proprietors -	88,001	4,47,701	5 0 14	5 4 3	1 0 7	
(2.) Paying such amount, plus a cash <i>Malikana</i> -	1,88,281	9,16,973	5 0 13	5 15 1	1 2 8	
(3.) Paying at stated cash rates per acre -	38,149	4,11,206	10 3 5	5 3 4	0 7 9	
(4.) Paying lump sums (cash) for their holdings -	49,077	3,14,299	6 1 25	6 8 2	1 0 3	
Total paying rent in cash -	3,69,849	21,57,111	5 3 13	5 13 10	1 0 1	For entire Province, including Muzaffargarh.

1.	2.	3.	4.	5.	6.	7.
Nature of Tenure.	Number of holdings.	Area of land held.	Average area of holding.	Average cash rent of each holding.	Average rent per acre.	REMARKS.
Grand Total.						
Paying in kind.	(1.) Paying by a stated share of the produce in kind.	A.	(a.) $\frac{1}{2}$ produce and more -	41,248	2,03,966	A. R. P. 4 3 31
			(b.) $\frac{1}{3}$ Produce and less than $\frac{1}{2}$ produce -	47,588	397,586	8 1 17
			(c.) $\frac{1}{4}$ Produce and less than $\frac{1}{3}$ produce -	25,408	2,21,825	8 2 37
			(d.) $\frac{1}{5}$ Produce and less than $\frac{1}{4}$ produce -	9,286	2,04,554	22 0 5
	(2.) Paying by a stated share of the produce, plus a further cash contribution.	B.	(a.) When the share of produce paid is $\frac{1}{2}$ and more -	8,836	64,679	7 1 11
			(b.) When the share of produce paid is less than $\frac{1}{2}$ -	3,033	32,232	10 2 23
	(3.) Paying a fixed amount of grain for their holdings with or without a further cash contribution.	C.	- - - -	826	3,988	4 3 12
	Total paying rent in kind -	-	-	1,42,221	12,25,487	8 1 4
	Grand total of tenants with right of occupancy -	-	-	5,12,070	33,82,598	6 2 17
	II.—Tenants holding conditionally.	-	-	-	-	-
III.—Tenants-at-will.	(1.) For life -	-	-	537	2,858	5 1 4
	(2.) For period on lease { (a.) Written -	14,289	1,05,834	7 1 25	9 7 10	1 2 7
	{ (b.) Not written -	10,141	33,795	3 1 13	7 9 8	2 4 6
	(3.) Subject to village service and payment of rent -	3,450	15,757	4 2 11	6 13 5	1 7 9
	(a.) Paying in cash -	5,70,352	27,88,089	4 3 22	5 4 10	1 1 4
IV.—Holders of service grants cultivating the lands held (i.e., parties enjoying freeholds from proprietors being excused all revenue).	(b.) Paying in kind { $\frac{1}{2}$ produce and more -	2,95,273	17,45,436	5 3 26	-	-
	{ Less than $\frac{1}{2}$ produce -	2,30,965	19,54,788	8 1 34	-	-
	(1.) Sankalap or Dharmarth -	22,332	50,107	2 0 39	-	-
Total -	(2.) Conditional on service -	18,077	29,483	1 2 21	-	-
	Total -	16,77,486	101,08,745	6 0 4	-	-

The figures in columns 2 to 6 are for 31 districts only, i.e., excluding Muzaffargarh, for which no details have been given.

For entire Province, including Muzaffargarh.

NORTH-WESTERN PROVINCES AND OUDH.

The oldest form of proprietary tenure found among the village communities of the North-Western Provinces is the *bhaiachara*. The essence of this tenure is, that the division of the land is based not according to ancestral right, by which each member or cluster of members owns a share resting on his relation to the common forefather and his position on the genealogical tree, but it is based on actual facts, each member of the brotherhood taking that portion which at the moment of crystallisation he actually holds; so that the stronger members got a larger, the weaker a smaller share. Where the division is minute, as it generally is (since such communities have always been on the land for many generations), a certain number of representatives called *lambardars* are elected, who collect from each

sharer his quota of the land-revenue and pay it into Government. All are mutually responsible for the revenue; that is, if any sharer falls into arrears, the rest are liable to have it collected from them, and must take their own measures to recover from the defaulter.

All other tenures are more recent in their origin, the mode of division indicating that the proprietary body have not yet forgotten their common ancestor or lost their family feeling, but divide their estate according to ancestral shares. There are two forms of such division—complete and incomplete, or, as they are called, perfect and imperfect.

3. When such a body of proprietors cannot any longer agree to act together or to accept the common headship of one representative, they generally proceed

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to a division. In former times they usually divided the cultivated land only, leaving the fallow waste in common; and this is called an "imperfect partition." Each shareholder, or each set of shareholders who still agree to hold in common, pays a share of the revenue proportionate to the share of cultivated land that has fallen to him or it. By degrees the fallow land is broken up and cultivated, and the rent received from it is generally taken in the first place to pay the revenue, the remainder only being distributed among the owners of the separate shares.

4. This, however, implies some remnant of communal action; and when party-feuds are bitter, the shareholders cannot agree as to the management of the undivided land, and the collection of rents from those who cultivate it. In this case they proceed to a "perfect partition," the whole of the village lands being divided, whether cultivated or waste. Each share or patti bears its portion of the revenue; and if the owner or owners of one patti fall into arrears, the other pattis are not responsible, and their owners can only be called on to pay up if they agree to take over the management of the defaulting patti for a term of years.

5. As all communal life leads to quarrels and feuds (especially in peaceful times, when the village community no longer have to maintain their existence by the sword), the undivided village tenure is necessarily the most recent in its origin, and is ordinarily not more than three or four generations old. This is known as the "zamindari tenure," in which there is no division of land, profits being divided among the owners according to the arithmetical fraction ($\frac{1}{2}$, $\frac{1}{3}$, &c.) of the share which each holds, after payment of revenue and common expenses. Ordinarily speaking, one man acts as the representative of the proprietors, collects all the rents from the tenants, pays the Government revenue and other charges, and distributes the profits. If the proprietors themselves cultivate land, a light nominal rental is written against it; and when the accounts are made up, it is assumed that each has already received that sum towards his share of profits.

6. These tenures, as will be easily understood, melt imperceptibly into each other. In bhaiachara estates there was sometimes at the time of partition a portion of land left undivided, so that they might be classified as perfect and imperfect bhaiacharas. In such cases the division of the common land is fraught with many difficulties; and if new land is taken into cultivation there is sometimes a new arrangement of rates, leaving possession of the new land to the proprietor who has taken it instead of new distribution of land. In all kinds of divided tenures the owners of any share or patti may hold it among themselves undivided on the zamindari tenure, or may subdivide it completely or incompletely. It would be easy to conceive that every kind of tenure might co-exist in a large bhaiachara village.

7. As time goes on, the shareholders multiply and crowd on the original soil; feuds and quarrels spring up; new purchasers get in who have no interest in common with the old owners; common land is broken up and rented; and from all these causes a process of differentiation goes on, and partition is called for. This takes the form of—

- (1.) Conversion of zamindari estates into imperfect pattidari estates;
- (2.) Conversion of zamindari or imperfect pattidari into pattidari estates; or
- (3.) Complete separation of all rights and interests, and conversion of the share or patti into a new and distinct estate.

8. This right of partition carries with it undoubted advantages. It enables a shareholder to escape from the frauds and oppressions of an astute or overbearing lambardar, or the encroachments of a money-lending purchaser. It limits his liabilities, and defines his rights. It is in harmony with the general process of individualisation which is going on, and which civilisation and law encourage. But that very process entails social and administrative evils of the gravest character.

The unlimited right of partition encourages the multiplication of numbers which may tread too closely on the productive power of the soil. There is no stimulus to instigate the younger son to go out into the world, to adopt a profession, or to emigrate, if he can always claim to divide off his inherited share in the paternal acres and to enjoy them as his sole property. From an administrative point of view, the multiplication of numerous properties from which the revenue has to be collected separately is a great evil. If they are distinct estates, the task of collection falls on the Government establishment, which must be strengthened. If they are only distinct shares in an estate, the task falls on the lambardar; and Mr. Alexander (Moradabad) has pointed out how great an evil this intricate subdivision is; and he mentions that in some parts to appoint a man lambardar is considered equal to fining him Rs. 200. He proposes, as a remedy, to limit the number of zamindars, i.e., that Government should refuse to recognise any subdivision of land, or of rights in land, below a certain minimum area. It is likely that, as the Deputy Commissioner of Kheri notices, the smaller the proprietor becomes, the harder he presses on his tenants. There is no doubt that the cost of collection to Government will become seriously greater as the process continues; and such has been found to be the case in some of the permanently settled tracts where subdivisions have been excessive.

9. It is an evil from an agricultural point of view that the land of each holder should be broken up and separated (for, even if the proprietor does not cultivate himself he has to give his tenants broken holdings), and it would be a great advantage to distribute cultivators' holdings as far as possible by blocks. It has been advocated that the rules under the partition law should make it understood that inability to divide an estate into compact blocks will bar partition, and that the power which is given by the law to the highest revenue court of appeal to disallow partition on this ground should be more strictly exercised by the lower courts except in special cases. The number of partition cases before the revenue courts in 1876-77 was between 4,000 and 5,000.

10. Other proprietary tenures may now be noticed, which arise from difference of circumstances as to the payment of revenue.

Revenue-free estates are held by possessors of valid grants made under native rule. A large number of grants were assessed some years ago as invalid, and the estimated revenue of those still free of all revenue demand is Rs. 1,08,727.

Nazarana estates, in which a fixed sum (nazarana) is paid "representing the tribute which revenue-free holders paid to the amils (Muhammadan revenue-collectors or governors) to secure their favour" (Moradabad reply). These estates are found only in the Meerut and Rohilkhand divisions.

Quit-rent holdings are few, having an estimated revenue of Rs. 7,697 only.

Udari estates are those estates in the Jhansi Division of which a fixed portion of the revenue is remitted.

Fee simple estates are those in which grantees have been allowed, under a law now obsolete, to buy up or redeem land-revenue; they occur in the Sub-Himalayan and hill tracts.

The following is an abstract of the remitted revenue (i.e., of the revenue estimated as lost to Government):—

	Nazarana hold- ings.	Quit-rent hold- ings.	Udari tenures.	Lands wholly revenue-free.	Fee-simple estates.
1876-77	Rs. 25,623	Rs. 7,270	Rs. 5,524	Rs. 1,08,727	Rs. 1,147
1875-76	26,719	8,646	5,149	1,07,465	1,141

11. The above tenures belong to the North-Western Provinces. Circumstances are somewhat different in Oudh, because a different evolution has followed a different history. At the beginning of the century the conditions of the two Provinces were similar. There were in the North-Western Provinces (when ceded) two classes of large revenue-payers both known as "talukdars." Of these, one class were the heads or the representative men of clans or large brotherhoods; the others were court-favourites, revenue-collectors or contractors. They were treated in various ways by the British Government. Generally they were allowed *malikana* (or seigniorage); occasionally they were vested with full proprietary rights, to the exclusion of all subordinate rights; and sometimes were not acknowledged at all, but ousted as usurpers, the subordinate proprietors being alone recognised. The result at the present date is, that in a few cases only the existence of a *malikana* payment (limited to 10 per cent. on the old revenue) still gives evidence of the former existence of a dual right.

12. The talukdars of Oudh have, on the contrary, been allowed to retain their superior rights, although in 1800 they probably were on the same level as the large revenue-payers of the North-Western Provinces. But before Oudh came into our hands the claims of the sub-proprietors were better understood, so that the superior revenue-payers did not in Oudh, as they did so often in the North-Western Provinces, obscure the position and take the place of the inferior holders, while at the same time their own claim to a superior right was admitted.

13. The manner in which the Oudh talukdars have acquired their position, and the nature of the subordinate rights which the law has recognised as existing under the talukdar, are described in the following remarks of Mr. Woodburn, Deputy Commissioner of Faizabad:—

"The history of these estates (talukdars' estates), their origin and growth, is a familiar debating ground in Indian politics. The district illustrates every variety of them. In one of its talukas the landlord is even now a merely nominal chieftain, *primus inter pares*, the nucleus to an agglomeration of clansmen. In another he is the hereditary head of an ancient *sept*, supreme in his family dignity, and almost unfettered in his proprietary privileges. A third estate has slowly been accumulated by the successive members of a careful and respectable family. The largest of all was founded by a brilliant adventurer, and built up with the aid of official influence by a far-seeing and unscrupulous successor.

"In the lands of every talukdar there exist, in more or less degree, sub-proprietary rights. They are of various kinds, both in origin and in value.

"The longest and most valuable of these is known as a 'sub-settlement.' The lands of a sub-settlement are ordinarily one or more entire villages, the property, as a rule, of one of those peasant-communities which elsewhere hold an independent position. The owners, whether for the protection of their lands or to secure a lighter revenue demand, sometimes at their own instance, sometimes under pressure, had included their estate in the revenue engagement of a powerful neighbour; or their lands had always recognised the feudal superiority of the chief of the clan, or grants to cadets of the leading-house had been divided to the growing generations in continuous subordination to the parent race. The feudal relationship we found at annexation has been maintained. The owners are under-proprietors of their estates. They pay to the baron the revenue assessed upon their lands, with a per-centage, which varies according to the amount of their former rents from 10 to 50 per cent. More than a third of the taluka villages are held on this tenure.

"In taluka villages which have been purchased from the old proprietors, or in which their rights have been depressed to a lower tenure than sub-settlement, the former owners have received almost everywhere provision of some sort in the assignment of an under-proprietary right in the fields of their cultivating

occupancy, rent free or at a privileged rate of rent. The latest returns report the number of sir-holders to be 3,290, with an occupancy of 21,878 acres, at a decreed rent of Rs. 47,585.

"In some instances the privileges and perquisites of the original owner had been so pressed out, that in the maintenance of the *status quo* which was the principle of the Oudh settlement there was found for them no place for favour. Cases of this sort were to a certain extent arranged for by the provisions of section 5 of the Rent Act. Owners of the soil who held their lands in independent tenure down to 30 years before the annexation are confirmed in the occupancy of the fields they held at the close of native rule at a rent $12\frac{1}{2}$ per cent. below the rents ruling for similar lands. Two thousand five hundred and six persons have received decrees for occupancy rights in an area of 7,032 acres.

"These may be called 'hereditary rights.' There are, besides these, acquired subordinate rights of great extent common to both talukas and the estates of zamindari communities.

"Grants of birt and shankalap (rent-free grants) are everywhere common. These are sometimes purely religious grants. They are more commonly secular assignments thinly veiled in a religious form. It is almost invariably the form in which a landlord gives a plot of waste to a small capitalist to bring under cultivation. The district is peculiar for the remarkable number of small hamlets which break the stretches of plain between the regular villages, each hamlet a fresh centre of cultivation and verdure. They are almost always the settlements of shankalapdars. Sometimes they paid money for the allotment; but they invariably got a formal conveyance, fixing the rent to be paid on the cleared lands.

"In the south of this district there is another common sub-tenure known as *biswi*. It is a mortgage of cultivated lands at a rent which is as much lower than the full rent as the yearly interest of the mortgage money. In many cases the transactions are of very old date, and the relationship has become confirmed under the rules of limitation.

"Under these conveyances nearly 6,000 tenures have been settled by decree. They cover an area of 39,547 acres.

"The holders of these acquired subordinate tenures seem to inherit the prudence under which they were farmed. They are rarely in difficulties. The owners of the ancestral sub-tenures, on the other hand, are very commonly embarrassed, sometimes very gravely so. In the case of sub-settlements this is not surprising. They are held and managed by the same classes as in independent villages. In the latter the owners are not supposed by Government to be able to pay more than half the net assets. In the sub-settlements they have often to pay three-fourths. It is only a rigidly methodical and punctual system that can save them from difficulty. This they have but seldom had the courage to give themselves. It is only within the last two years that the law has furnished any effectual means of ensuring the punctual payment of sub-settlement rents; and the earlier period in which they were left almost to their own wishes has loaded them with a rent debt which must be in unfortunately numerous cases ruinous.

"It would have been happier probably for all parties if these sub-settlement holders, owners of the soil, but, in fact, in the course of events now middlemen, had been reduced at once to the position of sir-holders, giving them exceptionally favourable terms of occupancy. It would have broken certainly the principle of the *status quo*; but it would have been a step quite familiar to the rough practices of the nawabi, and, taken at the first, would have been quietly accepted. It is the point to which they are now gradually drifting."

14. The agricultural statistics of the Province are not yet in a sufficiently forward condition to return the total number of proprietors in each class, but the following statement shows approximately how the cul-

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tivated area is distributed between the different classes. It is an abridgement of Statement No. I., which will be found at the end of this reply :—

Holders of Superior Tenures.	N. W. P.	Oudh.
Talukdars - - -	3 per cent.	59 per cent.
Undivided communities - -	39 "	16 "
Divided " - - -	51 "	20 "
Revenue free estates - - -	4 "	2 "
Others - - -	3 "	3 "

15. Land subject to different cultivating rights may be classed as follows :—

- (1) land held as sir :
- (2) land held by zamindars as tenants other than sir :
- (3) land held by tenants at fixed rates :
- (4) land held by privileged tenants :
- (5) land held by occupancy tenants :
- (6) land held by tenants at will :
- (7) rent free land held—
 - (a) as a grant by the landlord ;
 - (b) in lieu of wages.

(1.) *Sir* is defined in Act XIX. of 1873 to be the land recognised by village custom as the special holding of a co-sharer, and corresponds (to compare small things with large) to the home farm of an English proprietor. In this land no occupancy rights can accrue to any one to whom it is let for purposes of cultivation. It is generally valued in the village accounts at a very low rate of nominal rent ; and, on account of the privileges thus attaching to it, a shareholder in a divided village is not allowed to include more land in his sir than a certain quantity fixed in former years.

(2.) *Land held by zemindars as tenants other than Sir.*—There is nothing to prevent any proprietor from cultivating any area in excess of his sir that may be available, but he must then take it on the same terms as any other tenant. Resident proprietary families of which the members are numerous occasionally are found to cultivate a good deal of land in this way as ordinary tenants, and, until the late revision of settlement occurred, there was not a little difficulty in separating it from sir land proper.

(3.) *Tenants at fixed rates.*—In the permanently settled districts cultivators who have held their land continuously for more than 20 years are presumed, in default of proof to the contrary, to have held it since

the permanent settlement was made (in 1790), and to be entitled to the same benefits as were then conferred on the landlords ; *i.e.*, they have a right to sit at fixed rates, and cannot have their rental enhanced. This is the only cultivating tenure which is legally transferable.

(4.) *Privileged tenants* are "ex-proprietors," who, after their proprietary rights have been sold, are, under the present law, allowed to hold what was their sir land on favourable terms, *viz.*, at a rent of 25 per cent. less than ordinary tenants.

(5.) *Occupancy tenants*—those who have cultivated continuously for twelve years.

They cannot be ousted, except by order of a court on account of non-payment of rent, and cannot have their rents enhanced, except by decree of a rent court ; and then only up to the prevailing rate paid by similar land in the neighbourhood.

(6.) *Tenants at will* can be ousted at the end of the agricultural year, and can be rack-rented at the pleasure of the landlord.

(7.) "*Holders of grants*" are either relatives of the proprietors or religious members of the community who have been given a plot of land, free of rent, by the proprietors. They include the *shankalapdars* or *birtidars* of Oudh mentioned by Mr. Woodburn.

Those who hold "in lieu of wages" are village servants, *e.g.*, watchmen, sweepers, &c.

16. The agricultural statistics are not yet compiled with sufficient fullness to be able to state the number of the different classes of cultivators, or the area they hold, nor does any record at all exist regarding the tenants at fixed rates in the permanently settled districts, the privileged tenants, nor the holders of rent free land ; the numbers of these classes however are small. The following information has been supplied to show approximately in the North-Western Provinces the per-centage of cultivated area held by the three main classes of cultivators. The statement from which it is abridged (No. II.) will be found at the end of this reply.

Cultivated by the zamindars - - 26.5 per cent.

" tenants with occu-

pancy and other

rights - - - 41.7 "

" tenants at will - - 31.8 "

17. The following further statistics have been collected from settlement reports to show as far as possible the numbers of persons belonging to these classes, and the area they cultivate :—

NORTH-WESTERN PROVINCES.

DISTRICTS.	Cultivating Proprietors.		Tenants with Occupancy Right.		Tenants-at-will.		TOTAL.		Average Area.
	Number.	Area.	Number.	Area.	Number.	Area.	Number.	Area.	
Saharanpur - - -	37,762	Acres. 357,789	20,526	Acres. 147,694	36,320	Acres. 212,349	94,608	Acres. 717,839	7.5
Bulandshahr - - -	14,206	166,541	22,717	220,662	56,596	412,542	93,519	799,745	8.5
Aligarh - - -	15,193	204,938	28,380	258,749	43,752	433,485	87,325	897,172	10.2
Bijnor - - -	20,916	102,517	36,851	278,331	46,030	209,958	104,797	590,806	5.8
Budaon - - -	—	—	102,226	501,212	64,064	190,871	166,290	692,083	4.1
Barilly - - -	10,968	66,514	132,103	610,759	79,155	190,441	222,230	867,714	3.8
Shahjehanpur - - -	5,078	26,391	33,168	70,647	18,704	30,501	51,872	101,148	2.9
Mainpuri - - -	15,602	88,582	80,641	369,693	28,535	129,821	124,778	605,121	4.2
Farukhabad - - -	20,603	107,335	102,703	417,600	47,239	127,456	170,595	545,056	3.8
Etah - - -	13,531	99,184	71,459	379,651	32,859	129,732	117,849	619,329	4.9
Cawnpore - - -	—	—	—	—	—	—	199,857	799,428	4.
Fatehpur - - -	13,745	66,563	85,225	352,605	42,869	113,135	141,839	532,303	3.7
Jhansi - - -	—	—	3,697	31,736	2,699	13,495	6,396	45,231	7.
Azamgarh - - -	64,057	324,209	109,860	357,742	64,955	85,110	238,872	767,061	3.2
	231,661	1,610,563	830,554	3,997,082	563,777	2,278,896	1,847,928	8,580,727	4.64

DISTRICTS.	Numbers.			TOTAL No.	Area held by			TOTAL AREA.	Average Area per Head.
	Proprietors.	Resident Tenants.	Non-resident Tenants.		Proprietors.	Resident Tenants.	Non-resident Tenants.		
Lucknow - - -	16,452	87,801	26,627	130,880	Acres. 58,995	Acres. 347,566	Acres. 73,713	Acres. 480,274	3.67
Bara Banki - - -	6,751	99,496	35,783	142,030	89,296	375,286	69,711	534,293	3.76
Rai Bareilly - - -	10,530	87,631	23,624	121,785	65,387	290,037	72,930	428,354	3.51
Sultanpur - - -	19,734	171,072	57,305	248,111	83,935	333,236	88,349	505,520	2.04
Pertabgarh - - -	12,658	105,206	28,391	146,255	76,760	342,243	75,050	492,053	3.36
Gonda - - -	16,320	136,176	36,644	189,140	36,878	284,198	56,089	377,165	1.99
Baraich - - -	—	173,674	45,363	219,037	26,023	658,420	151,754	836,197	3.81
Sitapur - - -	—	104,760	53,705	158,465	—	585,562	193,434	778,996	4.91
Total -	82,445	965,816	307,442	1,355,703	437,274	3,214,548	781,030	4,432,852	3.27

18. Hardly any suggestions have been made by the district officers as to any alterations that can be made with advantage in the conditions of tenures, and very few officers have paid any attention at all to this subject. Mr. Alexander's proposal for restricting subdivisions has already been referred to. Mr. Dale (Mirzapur) points out that, when a transferable cultivating tenure is sold to a money-lender or other non-agriculturist, the purchaser becomes a middleman who pockets and lives on the difference between the pro-

jected rent he pays and the rack-rent he extorts, and he desires to make such sales impossible by declaring a cultivating tenure forfeited if the holder does not cultivate. A proposal has been made by Messrs. Elliott and Buck (but it is disapproved by the Board of Revenue) to curtail the frequency of enhancement suits, and to enable tenants at will to secure the rights of a higher class of cultivator by purchase. All these topics will be more fully discussed under the head of Chapter III. of the Report.

		Per-centage of Cultivated Area under each Tenure.							Per-centage of Revenue under each Tenure.							Remarks.		
		Talūqdārī.	Zamindārī.	Pattidārī.		Bhāiāchāra.	Revenue-free.	Others.	Talūqdārī.	Zamindārī.	Pattidārī.		Bhāiāchāra.	Revenue-free.	Others.			
				Perfect.	Imperfect.						Perfect.	Imperfect.						
Dehra Dūn	-	-	50	-	23	11	6	10	-	41	-	27	15	-	17			
Sahāranpur	-	-	17	1	48	31	3	-	-	16	1	48	35	-	-			
Muzaffarnagar	-	-	25	18	18	37	2	-	-	25	19	19	37	-	-			
Meerut	-	-	6	7	44	42	1	-	-	6	6	46	42	-	-			
Bulandshahr	-	-	69	3	7	20	1	-	-	69	3	8	19	1	-			
Aligarh	-	-	20	28	17	29	5	1	-	18	26	19	30	5	2			
Bijnor	-	-	67	9	10	10	4	-	-	69	9	10	12	-	-			
Moradabad	-	-	59	4	21	-	16	-	-	72	4	24	-	-	-			
Bareilly	-	-	57	23	13	3	3	1	-	59	24	14	3	-	-			
Budaun	-	-	38	41	16	2	3	-	-	40	42	17	1	-	-			
Shāhjāhānpur	-	-	8	51	23	18	-	-	8	55	21	16	-	-	-			
Muttra	-	-	3	27	3	-	59	8	-	4	29	3	-	64	-			
Agra	-	-	1	18	5	72	-	4	-	40	4	56	-	-	-			
Mainpuri	-	-	36	62	-	2	-	-	-	40	58	-	2	-	-			
Farukhabad	-	-	53	15	25	2	5	-	-	52	15	25	2	6	-			
Etāwah	-	-	63	9	18	7	3	-	-	66	10	20	4	-	-			
Etah	-	-	15	32	24	20	8	1	-	18	35	23	23	1	-			
Jalaun	-	-	30	-	55	7	1	7	-	31	-	60	7	1	1			
Jhānsi	-	-	13	14	1	63	4	5	-	6	18	1	71	4	-			
Lalitpur	-	-	49	4	10	-	23	14	-	61	3	26	-	-	10			
Cawnpore	-	-	51	23	24	2	-	-	-	49	24	26	1	-	-			
Fatehpur	-	-	66	12	19	3	-	-	-	64	13	20	3	-	-			
Bānda	-	-	50	2	42	2	4	-	-	48	2	46	2	2	-			
Allahabad	-	-	12	50	8	24	4	1	5	55	9	26	5	-	-			
Hamirpur	-	-	37	3	39	20	1	-	-	35	4	39	22	-	-			
Jaunpur	-	-	2	46	10	41	1	-	-	49	10	40	1	-	-			
Azamgarh	-	-	21	6	63	9	-	1	-	22	4	64	9	-	1			
Mirzapur	-	-	21	12	1	32	-	34	-	31	27	2	40	-	-			
Benares	-	-	40	19	39	-	2	-	-	45	18	37	-	-	-			
Gorakhpur	-	-	No return received.							-	No return received.							
Basti	-	-	22	3	63	1	3	8	-	24	3	68	1	1	3			
Ghāzipur	-	-	46	11	35	7	1	-	-	46	13	35	6	-	-			
Kumaun	-	-	Statistics incomplete.							1	-	-	-	92	7	-		
Garhwāl	-	-	Statistics incomplete.							Statistics incomplete.								
Tarāi	-	-	22	9	3	-	2	64	-	37	18	6	-	-	39			
Lucknow	-	-	Details of cultivated area not furnished.							29	25	2	32	1	10	1		
Barabanki	-	-	50	11	1	35	1	2	-	52	10	2	34	1	-			
Unao	-	-	29	33	4	28	3	1	2	27	31	4	31	4	1	2		
Fyzabad	-	-	75	10	-	11	1	2	1	74	10	-	11	1	2	2		
Bahraich	-	-	91	4	-	3	-	2	-	90	4	-	4	-	2	-		
Gonda	-	-	73	12	2	5	-	3	5	75	13	2	6	-	4	-		
Sitapur	-	-	51	15	2	12	6	1	13	51	14	2	11	7	1	14		
Hardoi	-	-	24	29	8	35	1	3	-	26	27	9	34	1	3	-		
Kheri	-	-	67	23	1	1	-	3	5	67	23	1	3	4	1	1		
Rai Barell	-	-	62	12	1	17	-	4	4	62	12	1	16	-	5	4		
Sultanpur	-	-	52	11	1	23	8	2	3	51	11	1	24	8	1	4		
Partabgarh	-	-	79	13	1	3	2	1	1	36	60	1	1	1	-	1		

STATEMENT II.

STATEMENT showing PER-CENTAGES of AREA under different Holdings in the Districts of the North-Western Provinces to the Cultivated Area.

	Of Land occupied by Zamindars.	Of Land occupied by Occupancy Tenants.	Of Land occupied by others.	Remarks.		Of Land occupied by Zamindars.	Of Land occupied by Occupancy Tenants.	Of Land occupied by others.	Remarks.
Dehra Dún	30	70	—		Jhānsi	42	28	30	
Sahāranpur	49	21	30		Lalitpur	19	32	49	
Muzaffarnagar	39	27	34		Cawnpore	16	62	22	
Meerut	49	24	27		Fatehpur	12	55	33	
Bulandshahr	21	28	51		Bānda	27	34	39	
Aligarh	23	29	48		Allahabad	6	67	27	
Bijnor	14	36	50		Hamirpur	33	32	35	
Moradabad	10	58	32		Jaunpur	17	37	46	
Bareilly	7	52	41		Azamgarh	42	34	24	
Budaun	17	60	23		Mirzapur	—	—	—	Return not received.
Shāhjāhānpur	14	61	25						
Muttra	33	33	34		Benares	22	28	50	
Agra	22	52	26		Gorakhpur	25	29	46	
Mainpuri	18	61	21		Basti	27	23	50	
Farukhabad	19	61	20		Ghāzipur	32	52	16	
Etāwah	13	59	28		Kumaun	69	19	12	
Etah	17	61	22		Garhwāl	74	20	6	
Jalaun	34	18	48		Tarāi	9	54	37	

BENGAL.

Land Tenures, &c.—The following account of the land tenures of Bengal, taken almost *verbatim* from a memorandum by the late Mr. McNeile, C.S., will explain generally the state of affairs existing in the Lower Provinces.

The decennial settlement of Bengal and Behar, commenced in 1789, and completed in 1790–91, was declared to be permanent in 1793. The zamindars, with whom the settlement was originally made, were powerful chiefs, holding vast tracts of country, of which by the settlement they were constituted *proprietors*. Owing to the unbending character of the Government demand, which could not be enforced against tenants with equal rigour, these large estates were speedily broken up and subdivided into a large number of smaller ones, the purchasers of which succeeded to the proprietary rights of the original holders. The only condition of continuance of this proprietary right was the punctual payment of the Government demand. The zamindars, as the proprietors are called, seeing how the Government had escaped all the labour and risks attendant on detailed *mofussil* management, were not slow to follow the example set them. They disposed of their estates in a similar manner by creating permanent under-tenures called *patni* tenures, extensive tracts being leased out in this way on long terms. By the year 1819 these alienations had become so common that they were formally recognised by Regulation VIII. of that year. The practice of creating these under-tenures was steadily continued until the present day, when but a small proportion of the whole permanently settled area of Bengal remains in the direct possession of the zamindars. In making these alienations, or in letting their lands out in farm, the zamindars exact a bonus and obtain far better terms than the Government originally got from them.

The process of sub-infeudation described above has not terminated with the *patnidars* and *ijaradars*. *Darpatnis* and *darijaras*, and even further subordinate tenures, have been created in great numbers (*vide annexure*). These tenures and under-tenures often comprise defined tracts of land; but the more common practice has been to sublet certain aliquot shares of the whole superior tenure, the consequence of which is, that the tenants in any particular village of an estate now very usually pay their rents to two, or many more than two, different masters so many annas

in the rupee to each. Some few similar under-tenures which existed before the permanent settlement were then recognised as such, or have been since confirmed by lapse of time. In addition to these tenures, the country is dotted over with small plots of land held revenue-free, the large majority of them having been granted by former Governments, or zamindars under those Governments, as religious endowments—grants which have since been recognised and confirmed by the English Government.

Of the ryots who actually till the soil there are three classes—

- 1.—Those having permanent holdings at fixed rents;
- 2.—Those having rights of occupancy but liable to have their rents raised on certain grounds laid down by law; and
- 3.—Tenants-at-will.

The tendency of the proprietors and tenure-holders of Bengal has been to reduce as far as possible the area held by ryots of the first two classes, and to convert them into those of the third. In Eastern Bengal the process of sub-infeudation has created a large class of petty cultivating proprietors, and as a rule the ryots of those parts are well able to hold their own. But in Northern Bengal, and especially in Behar, the system of creating under-tenures, and giving out estates to farm on short lease, has had the effect of reducing the peasantry to a state of hand-to-mouth existence, which has long called for legislative interference.

The economic effect of the various processes above described has been this. As stated in the answer to question 13, the road cess returns show that the gross rental of the land in Lower Bengal is now nearly four times as large as the Government revenue due from it. Since the time of the permanent settlement of Bengal, two concurrent processes have been at work to produce their joint effect, viz., the extension of cultivation and the fall in the value of money. As to the latter, this value being a relative quantity, it is difficult to gauge its fluctuations with accuracy, but, on the whole, there can be no doubt that less than 50 per cent. will not adequately represent the amount of the fall during the last eighty years. It is an obvious reflection that this has halved the value of the Government revenue assessed on the Lower Provinces in 1793. Who has

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reaped the benefit of this increase? The zamindars have obtained a portion of the profits, perhaps a considerable portion; but they have excluded themselves by the creation of permanent under-tenures from a large share of the prospective augmentation of the rental of their estates. The same observation applies to under-tenants who have adopted the same course. The ryots, however, though there can be no doubt that their position has on the whole greatly improved and that the money value of the wages of labour and the profits of small proprietors have largely increased, are yet still, as a rule, in the position of living from hand to mouth, and have no accumulated resources to fall back upon in times of scarcity and distress, though in the eastern districts they are year by year becoming comparatively independent of money-lenders. The traders and money-lenders are beyond all question the classes who have secured the mass of the increased wealth of the country. It is not too much to say that they have amassed such riches and such influence as to become the most powerful class in the community. They very often invest their gains in landed property, and thus supply new blood to the old landholding classes. But while they bring fresh energy and intelligence to bear upon the development of the resources of their properties, they are harder on their tenants than the original proprietors were. The best available figured information bearing on the Commission's 10th question appears to be contained in the printed statistics compiled for each district from the records of the Road Cess Department. Even in these the area covered by each tenure, or class of tenures, is not given. It is probably in most cases quite unknown to the zamindar himself; so great has been the extent of the sub-infeudation and sub-division of tenures in some parts of Bengal during the last century. Without a cadastral survey, accompanied by such detailed field to field statistical inquiries as form a part of settlement proceedings, it is impossible to give for Bengal, with any degree of statistical accuracy, the information asked for in question 10. As some index and test of the comparative wealth and position of the various tenure-holders and ryots, the figures in the statement on the following page have been prepared from the road cess papers above referred to. It will be observed how large a proportion of the ryotee holdings pay a rental of between Rs. 5 and Rs. 20 per annum, and how much larger a proportion pay less than Rs. 5. The figures given under the head of ryotee holdings will not accurately represent the number of individual ryots, for many of them hold land in more than one estate, under more than one landlord, and would under such circumstances have been counted more than once in the returns. The returns which the Road Cess Law required only provided that

the number of ryots and the amount of rent paid by each should be shown in the returns due from each estate. There was no obligation on the landholder to state the area or the number of plots held by each ryot. Still, for comparative purposes, the figures are valuable and show in a remarkable manner how the increased pressure of the population on the soil tends more and more to create petty holdings and break up large ones. Columns 16 to 19 show the extent to which sub-infeudation has been carried on in Bengal.

It may be safely assumed that those ryots who pay less than Rs. 5 per annum for their holding, supplement their resources by service or by labour of some kind, whether at home, or in the fields, or on public and private works. They would in time of famine or scarcity be the next, after the purely landless classes, to resort to such works as were opened by the State. Ryots paying between Rs. 5 and Rs. 20 would, as a rule, be more or less dependent on State help according to the circumstances of the season, and the severity of the failure of crop. All those paying over Rs. 20 may be fairly said to be able to take care of themselves, but they, as will be seen from the figures, form but a very small part of the whole.

The only change in conditions of tenure, which it would apparently be feasible and advantageous to make at present, is that which has been recently proposed, viz., to make the occupancy ryots' tenure generally transferable *by law* to other cultivating ryots. As a matter of fact, the transferable character of these tenures has been affirmed by local custom in very many districts simply as an occupancy tenure, and the landlord has the same remedies against the new tenant, and the same powers of enhancement, that he had against the old. It is believed that the general recognition by law of the transferability of the occupancy tenure would have no injurious effect upon the position of the zamindars, while it would certainly tend to improve the condition of their tenantry, and to give them a greater interest in the improvement of their lands. Nothing could be better calculated to improve the system of cultivation, and the value of an estate, than permanency and security of the ryots' tenure. If after securing by law transferability of tenure to the occupancy ryot (a right which he already possesses by custom in many parts of the country) provision were made in the law to prevent him from converting himself into a mere middleman, or transferring to non-cultivating holders, and for strictly regulating the character of the sub-letting to which an occupancy ryot must limit himself, it would seem that a great improvement would be effected in the law of tenant right in Bengal, such as would tend to raise the value of property and increase the landlord's security for his rent.

STATEMENT showing the ECONOMIC CONDITION OF BENGAL with regard to Estates, Tenures, and Holdings of different Values.

DIVISION.	DISTRICT.	NUMBER OF ESTATES IN THE DISTRICT WITH AN ANNUAL RENTAL OF				NUMBER OF RYOTE HOLDINGS IN THE DISTRICT PAYING AS RENTAL								NUMBER OF TENURES IN THE DISTRICT WITH AN ANNUAL RENTAL OF				OF THE TENURES IN COLUMN 14.				REMARKS.			
		Less than Rs. 100.		Total.		More than Rs. 100.		Rs. 5 and over.		Rs. 5 and over.		Rs. 5 and over.		Less than Rs. 100.		Total.		Held direct of the estate.		Sub-infeudated to Degree.					
		Rs. 100 and over.	Rs. 100.	Rs. 100.	Rs. 50.	Rs. 50.	Rs. 20 to 50.	Rs. 20 to 50.	Rs. 5 and over.	Rs. 5 and over.	Rs. 5 and over.	Rs. 5 and over.	Rs. 5 and over.	Rs. 5 and over.	Rs. 100 and over.	Rs. 100.	Total.	Rs. 100 and over.	Rs. 100.	Rs. 100.	First.		Second.	Third.	Fourth.
		3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20						
BURDWAN.	Burdwan	1,733	4,770	6,503	1,663	12,827	70,124	212,011	318,501	618,126	23,189	48,781	71,970	10,100	47,577	13,275	938	79	2						
	Bankura	448	424	872	385	12,670	22,749	20,807	47,572	73,485	1,114	5,659	6,773	3,183	1,130	237	50	2							
	Hooghly	468	166	634	701	5,312	26,909	97,344	208,717	388,963	1,593	18,705	15,945	8,094	6,559	375	15	15							
	Hooghly with Howrah	916	2,657	3,573	701	5,312	26,909	97,344	208,717	388,963	1,593	18,705	15,945	8,094	6,559	375	15	15							
PRESIDENCY.	24-Pergunnahs	1,327	876	2,203	559	9,901	42,009	123,697	207,690	388,166	4,468	11,338	15,801	11,228	4,119	357	54	23							
	Nuddea	2,251	3,331	5,582	881	4,850	23,004	70,272	215,398	323,594	2,953	5,509	8,462	4,678	2,539	875	75	125							
	Jessore	1,035	1,990	3,025	69	3,890	22,071	105,160	191,134	323,037	5,512	43,781	49,293	18,729	18,729	5,691	1,296	125							
	Moorsheebad	1,500	1,643	3,143	681	3,347	27,689	112,126	255,917	425,700	2,122	13,148	15,270	6,762	5,959	2,318	521	10							
RAJSHAHY.	Dinaporet	1,205	506	1,711	99	2,006	28,450	144,849	433,803	600,960	9,651	7,517	10,168	0,321	2,062	537	125	3							
	Raibahar	433	246	679	66	605	11,323	53,256	69,029	135,269	1,063	3,273	4,276	3,960	193	63	2								
	Bogra	749	514	1,263	31	690	7,201	48,252	110,587	166,671	607	3,140	3,837	3,041	725	69	2								
	Darjeeling	1,013	3,186	4,199	206	1,429	5,635	12,911	8,348	23,069	3,082	5,985	9,067	6,000	2,518	486	8								
DACCA.	Dacca	1,840	6,098	7,938	156	839	7,556	75,187	245,853	329,131	1,027	16,309	17,337	14,076	3,309	2	2								
	Purandhore	569	1,777	2,346	33	176	2,255	21,194	120,107	143,675	369	11,012	11,411	10,440	993	5	5								
	Bakergunge	1,867	1,983	3,850	883	4,363	29,048	118,753	509,017	682,006	10,701	245,186	261,887	69,770	150,578	46,611	11,712	2,463							
	Typperah	2,869	3,418	6,287	200	1,743	23,922	174,079	353,768	553,707	5,386	22,542	27,928	20,136	6,017	985	60								
CHITTAGONG.	Chittagong	1,075	1,209	2,284	143	2,147	28,308	148,675	307,680	546,962	2,733	9,309	12,132	12,132											
	Chittagong Hill Tracts*																								
	Patna	6,174	2,877	9,051	7,146	17,775	46,985	85,608	123,294	231,098	2,604	7,940	10,544	10,372	168	4									
	Shahabad	5,467	2,339	7,806	1,811	8,278	47,459	173,783	254,189	435,401	2,740	8,112	10,852	9,331	1,252	89									
PATNA.	Dumraon	5,367	3,653	8,990	1,207	8,860	36,335	146,098	254,119	442,409	2,965	9,636	11,601	10,359	1,143	89									
	Meerapore	4,307	3,653	7,960	1,207	8,860	36,335	146,098	254,119	442,409	2,965	9,636	11,601	10,359	1,143	89									
	Saran	4,890	801	5,691	512	1,502	21,168	115,062	200,223	317,804	1,101	7,756	9,217	5,921	556										
	Chumbarun	362	175	537	512	1,502	21,168	115,062	200,223	317,804	1,101	7,756	9,217	5,921	556										
BHAGULPORE.	Monghyr	2,352	3,186	5,538	1,311	5,088	25,107	89,050	193,686	316,321	1,091	5,293	7,284	5,201	1,959	113	11								
	Bhagulpore	1,771	2,860	4,631	2,728	9,114	40,976	113,902	166,864	333,634	1,634	3,166	4,800	4,800	1,380	63	3								
	Purneah	924	899	1,823	2,461	4,675	15,422	60,250	199,604	281,481	2,626	9,091	11,617	10,171	1,380	38	1								
	Kailash	822	368	1,191	281	669	4,985	42,807	197,175	205,517	357	1,500	2,317	2,917	263										
ORISSA.	Sonthal Pergunnahs*																								
	Cuttack	1,750	11,233	12,983	302	861	9,894	71,513	274,023	356,505	1,770	10,447	12,217	11,158	969	60									
	Pooree	1,391	5,146	6,537	13	109	8,101	24,374	149,468	191,132	1,580	33,573	35,452	28,179	7,041	232									
	Balasore	1,397	10,723	12,120	35	352	2,546	30,993	108,109	141,817	265	16,315	16,560	16,560	330										
CHOTA NAGPORE.	Hazareebagh	290	296	586	108	666	4,738	36,945	42,671	84,721	3,030	13,832	17,762	7,802	7,928	1,964	248	17							
	Lohardugga																								
	Singbhoom																								
	Shahdol	61	5	66	108	666	5,045	46,213	63,283	118,275	2,853	8,798	11,561	7,388	3,790	433	15								
Total		51,162	75,123	129,285	25,241	119,617	632,353	2,789,490	6,136,264	9,752,884	103,916	620,394	724,310	392,698	265,726	75,965	15,168	2,728							

Note.—In the road cess valuations, estates with a revenue not exceeding Rs. 100 and revenue-free estates admitted of summary valuation. When thus valued, if the proprietors accepted the valuation no returns were received, and consequently no detailed information of the kind given above was obtained. Hence on a rough average the figures given in columns 6 to 11 only embrace about three-fourths of the entire area under cultivation. Similarly the figures in columns 12 to 19 will not be perfectly correct.

* The Road Cess Act is not in force in the districts of Chittagong Hill Tracts, Patna, and Orissa.

† The returns from these districts have not yet been received.

‡ In the following districts sub-infeudation goes beyond the fourth degree, viz., 24-Pergunnah and Jessore have each 11 sub-tenures of the fifth degree, Bakergunge 572 of the fifth, 176 of the sixth, and eleven of the seventh. Hazareebagh has three of the fifth degree.

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CENTRAL PROVINCES.

I.—The proprietary tenures are those of—

- | | | |
|----|--|---|
| A. | { Zamindars, } Chieftains holding large, hilly, compact tracts. | |
| B. | { Talukdars, } More or less pensioners on the land. | |
| C. | { Superior proprietors, } Owners and headmen of villages. | |
| | { Malguzars, } | |
| | { Inferior proprietors, } | |
| | { Patels, } | |
| | { Gouteahs, } | |
| D. | { Maafidars, } | General term used in the Nagpur Province. |
| | { Assignees of full Government revenue in mahals. } | |
| | { Assignees of part of the Government revenue in mahals, or quit-rent proprietors. } | |
| E. | { Mokassadars, } | Saugor and Nerbudda term. |
| | { Ubaridars, } | |
| | { Maktadars, } | Nagpur Province term. |
| F. | Malik Makbuzas, proprietors of a division of a mauzah, or proprietors of their own holdings. | |

The maafidar of a field is the proprietor of his holding, and also the assignee of the Government revenue assessed on such field.

II.—The occupancy tenures are—

- G. Absolute occupancy ryots.
H. Occupancy ryots.
J. Tenants-at-will.
K. Service holders.

The malguzari or proprietary rights were conferred on single individuals, or on the headman of undivided families, on the sharers of a divided family, or in pattidari estates, on representatives of the shareholding families, in the few Byachara villages, on the proprietary community.

The Zemindars and Jaghirdars are chieftains, holding large compact estates, formerly granted as feudal holdings. The revenue demand to be paid by them is fixed for their whole estate at easy rates, and not with reference to the amount of rent derived by them from each individual village. These are found mostly in the Chhattisgarh division, Chanda, Bhandara, and Balaghat, and the Jaghirdars in Chhindwara.

In some of their villages inferior proprietary rights have been bestowed on relatives of the chief or on headmen of villages on account of special grants, long possession, or for having brought the village into cultivation. Such inferior proprietors are in most respects equal to malguzars, paying their fixed quotas to the Zamindar instead of paying to Government.

Talukdars are in a position of less dignity, and their lands are often scattered; each individual village has been settled, and the total amount which they pay has been calculated on the assessments of separate villages.

In these estates the Talukdar is for some villages the sole proprietor, or malguzar, and is only called by the higher title out of compliment; but in many villages inferior proprietary rights have been conferred on the headmen, as in the case of Zamindari estates. The sub-settlement provides what amount is to be paid to the Talukdar, and this varies from 10 to 50 per cent. above the fixed Government demand payable by the Talukdar into the treasury. In a few cases the settlement was made direct with the sub-proprietors, who pay into the treasury the Government demand plus malikana, which last is paid from the treasury to the Talukdar, or, as he is sometimes called in Chhattisgarh, the Talutdar. The superior proprietors are, for single villages, the persons with whom the settlement has been made, there being an inferior proprietor who pays to the superior proprietor the village jama plus malikana, the former of which the superior proprietor pays into the Government treasury. The superior proprietor is, in fact, for a single village, in the same position as the Talukdar

stands towards his villages in which inferior rights have also been acknowledged.

This superior proprietor is a pensioner on the land, the inferior proprietor being the village manager.

The superior proprietor of a Talukdari estate is something more than this, as Government has the security of his whole taluk or estate for the payment of the jama of each village.

Inferior proprietors have been described above. Generally they are in the same position as malguzars, but instead of paying to Government, where the settlement is not made direct with them, they pay to the Zamindar, Talukdar, or other superior proprietor the Government revenue demand, plus malikana. In other words, they divide the profits with the superior proprietor, but the amount the superior thus receives has been fixed at a certain sum under the terms of the settlement.

The introduction of the malguzari settlement, borrowed from the north-west, commenced in 1854. Proprietary rights were conferred on such person or persons or cultivating communities as appeared from ancestral right or long possession, or both, to possess the best claims. Such properties were made subject to all the incidents of real property, and could be sold for arrears of rent, for debt, at the pleasure of the owner, or could be mortgaged, or given away, or, under due safeguards, partitioned.

"Malik Makbuzas" are the owners of holdings less than a full village, that is, divisions of a village; they represent the Junadars, the Kadimi Kastkars, the Watandars, the descendants of ousted Patels of the original founders of the village and the holders of resumed rent-free plots, and the like. For convenience the revenue is not collected from them direct, but they pay their assessed revenue quota to the Malguzar of the village in which the holdings lie, plus cesses (if the holding be assessed at more than 10 rupees) plus Haq-ul-tahsil, that is, a per-centage enjoyed by the Malguzar for his trouble of collection and his responsibility to Government for this item of revenue. This is also supposed to cover the Malik Makbuzas's share of the common village expenses.

A Maafidar is simply an assignee of the Government revenue, whether it be of a whole village or of a share of a village or of a rent-free plot, such as is above described as the property of a Malik Makbuzas. He is often the proprietor of the whole village.

Properly speaking a Mukassadar (a Nagpur term) is a Maafidar.

A Maktadar (a Nagpur term corresponding to the Ubaridar of the Saugor and Nerbudda territory) pays a quit-rent. That is, he pays something less to Government than what is the full Malguzari assessment on the village, or in the case of Ubaridars, sometimes on the group of villages belonging to one owner. It is a privileged tenure. Generally on the death of an incumbent the estate is brought on to full rates or to a higher rate. He is the assignee of a portion of the Government revenue demand. These tenures have an historical and political basis.

In Nimar and Chanda the Patel is the substitute of the Malguzar, being the village headman, but his rights in respect of raising rents, in the management of the waste lands, and of obtaining partition are restricted for the term of settlement.

In Sambalpur, the Gaoteah is similar to the Malguzar; he retains for his trouble and responsibility, free of revenue, his bograh or sir lands, worth about one-fifth of what would be the full revenue on the full village cultivation. He annually distributes the fields and their respective revenue burdens among the ryots, if the custom of the village requires it, otherwise he merely re-apportions the revenue demands. If he cultivates more land than his bograh, he has to assess his excess equally with the lands of the cultivators. His position is clearly shown in the following extracts

from Lieutenant Birch's report in 1857, which form the basis of our present summary settlement:—

"The Gaoteahs or headmen of villages are a description of middlemen holding 814½ villages and 445 hamlets. Their duty is to attend to the improvement and cultivation of the village lands, to apportion the Government demand, and to collect the rents from the ryots. They are required to furnish information of all crimes committed within their boundaries, and to assist the police not only in apprehending but in conveying offenders to the Sadar station. They are also expected to apprehend all criminals discovered in the act of committing crime, and are bound to keep up all established roads, bunds, &c. They are permitted to hold a certain amount of land in each village, called bhogra land, rent-free, and they are held liable in person and property for the Government demand from the villages included in their leases.

"The lands held rent-free by the Gaoteahs are considered sufficient remuneration for the performance of the duties imposed on them. They are not permitted to exact from their ryots any more than the Government demand, nor can they oust any of them without showing good cause for doing so; but they are left to make their own arrangements with the ryots, and generally their settlements are made after either of the two following modes, either the lands are divided amongst the ryots in such a manner as that each portion shall contain the same relative proportion of the different qualities of land as is contained in the whole village, or else the ryoti lands are divided into equal parts; each part is assessed at the same amount; each ryot takes one, two, or more portions, according to his means, and the Gaoteah risks any loss that may befall him from the inferior lands not being taken. The former method is more general, but the latter principally prevails in pergunnas Chunderpore and Booteeah, where the surface of the country is usually level and the difference in the quantity of land very slight."

The occupancy tenures are: first, those of absolute occupancy ryots. These are the ryots, (1) whose previous possession carried with it something of an hereditary character; (2) who had expended such capital on their fields as to give them some special title; (3) who are relations of present Malguzars or former Patels, and whose occupancy right might be considered to some extent as a substitute for a share in the proprietary right in the village; (4) ryots of new villages who had held their fields since the village was founded, or since their fields had been reclaimed from the jungle; (5) those who had held their fields from a date antecedent to this proprietor's connexion with the village as its landlord; (6) ryots cultivating lands which had descended to them by inheritance, provided that the possession, either by themselves and some other persons from whom they inherited, had lasted continuously for not less than 20 years; (7) ryots* of villages in which the Malguzar was an absentee, and had held under 20 years, and, in the Zamindaris, ryots who had held continuously for 12 years and upwards.

The chief features of the absolute occupancy tenure are:—

1. That all ryots recorded in the settlement misl as possessed of an absolute right of occupancy shall continue for the term of the present settlement to pay rent at the rates specified in the settlement record, and shall not during the currency of such settlement be liable to enhancement of rent or to payment of any cesses or fees, other than those leviable by common consent and village custom from all ryots.†

2. That fixity of rent for term of settlement liable only to revision at recurrence of regular settlements from time to time hereafter is to be a permanent incident and a perpetual characteristic of the tenure of the said ryots.

3. That the said ryots shall in future be known as absolute occupancy ryots, holding at fixed rents.

4. That the said tenure shall be regarded as entirely heritable, not only from father to son lineally, but collaterally also to nearest of kin.

5. That the said ryots shall have the power to sublet or otherwise temporarily provide by mortgage or any other like manner for the occupation and management of their land, and that our (the Malguzars') consent shall not be necessary to any such arrangement. Such manager or temporary occupant shall not be liable to pay us a higher rent than that leviable from the absolute occupancy tenant.

6. That the said ryots shall have the power to transfer by sale, gift, or will their occupancy right with all its privileges, on payment to us of a sum equal to one year's rent for such land, provided that in every such case the tenure shall be offered for sale in the first instance to us, at a sum amounting to five years' rent of such land, plus the full value without interest of all permanent improvements effected solely by the ryot, since the fixation of the rent, and shall not be sold to any other person unless we shall for the space of one month refuse or neglect to complete the purchase.

7. That the said ryots shall have power to improve their holdings, sink wells therein, and use canal water thereon, without paying us higher rent than may have been fixed as above.

8. That these conditions shall have force only in respect of the fields which the said ryots shall be recorded in the settlement papers as holding on an absolute occupancy tenure.

In Nimar and Chanda absolute occupancy ryots have restricted powers of transfer and mortgage, but any such tenant who has a right to receive compensation for improvements when he is ejected, has a right to transfer to any person so much of his holding as may be affected by, or cannot be properly separated from land affected by such improvements, together with his right to compensation on ejection. The person to whom land may be transferred under this rule will hold as a tenant-at-will, unless the tenant from whom he received such land held under an unexpired lease which he could transfer, or possessed a transferable right of occupancy, and shall have transferred the lease or occupancy also. Every absolute occupancy tenant will also be entitled to transfer his holding, or any part thereof, with all its privileges, without the consent of his landlord:—

- (1.) To any person who has become by inheritance a co-sharer with him in such holding;
- (2.) To any person to whom the holding would descend on his death under the provisions of the law for the time being in force.

Absolute occupancy tenants will continue for the term of the settlement to pay rent at the rates specified in the settlement record, and will not, during the currency of the settlement, be liable to enhancement of rent, or to payment of any cesses or fees other than those leviable by common consent and village custom from all cultivators and authorised by the Chief Commissioner.

In the next class the conditional occupancy ryot is one who has acquired rights under Act X. of 1859. Notice in due form and before the end of Chait month must be served on such ryot, stating specifically on what grounds the Malguzar intends to enhance rent. The ryot can then contest, or he can wait till the Malguzar sues formally for enhancement or for arrears at enhanced rates. But enhancement is mostly effected by mutual consent.

In the Nimar and Chanda districts all tenants cultivating (save on sir lands) at the time of settlement became occupancy ryots with rent fixed for the time of settlement. During its currency, however, the Patel is allowed to bring one suit, and only one, for enhancement of rent.

All tenants on sir lands and those who have come in since the settlement, or who have, without special

* This is a special rule for Chanda.

† Supplementary village Wajib-ul-arz.

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protection, brought in waste lands, as well as transferees of portions of absolute occupancy holdings are tenants-at-will in Nimar and Chanda.

Tenants-at-will in other districts are cultivators on sir lands, those who have fallen from the superior grades, recent settlers in the village, or those who were not at the settlement recorded as privileged holders and have not since acquired rights of occupancy under Act X. of 1859.

In Sambalpur no cultivator can be deprived of his

right to cultivate a portion of the ryoti land of the village, so long as he pays his quota of the Government revenue demand.

Service holdings are lands allotted to village servants for the time being for the services performed by them to the village community.

Area of cultivated land occupied under each kind of tenure:—

As to the areas cultivated by each class I find that the holdings are now as follows:—

	Holdings.	Area.	Average area.	Average rent.	Per acre.
			Acres.	Rs.	Rs. a. p.
Absolute occupancy tenures - - - -	149,715	2,994,300	19½	16½	0 13 6
Conditional occupancy tenures - - - -	121,807	1,948,912	15½	12½	0 13 0
Tenants-at-will - - - -	469,031	6,566,434	14	8½	0 10 0
Service tenures - - - -	51,073	204,292	4	*1½	0 6 0

* NOTE.—This is what the rental would be if the plots were not held on service tenures, free of rent. But no deduction would be made on this account from the total of the village assessment.

The balance of the cultivated land is cultivated by the proprietors,—in our few Byachara villages by the community, the sir, bograh, and other lands by the Malguzars, Patels, and Gaoteahs, and by Malik Makbuzas and Maafidars.

The area is 3,930,763 acres, but I cannot give the number of holdings. The total number of the settled and maafi villages in the Provinces is 36,891. I am unable to give a complete account of the numbers and the holdings of the Malik Makbuzas at the present time.

At the settlement there were in:—

Jubbulpore - - - -	4,180
Saugor - - - -	2,936
Chanda - - - -	4,063
Bhandara - - - -	2,336
Mandla - - - -	62
Damoh - - - -	2,887
Chhindwara - - - -	456
Bilaspur - - - -	1,354
Seoni - - - -	360
Hoshangabad - - - -	398

In Wardha their holdings aggregated 149,202 acres.

At the settlement there were 15,119 proprietors, assignees of the whole or of portions of the Government revenue demand. I cannot separate the holders of divisions of a village from the holders of whole villages. Since then some of the Malik Makbuza holdings have been purchased by Malguzars or relinquished, and some Maafi holdings have lapsed and become Malik Makbuza holdings.

As to character of the tenure affecting the economic condition of the person holding it:—

Apparently the character of the tenure is to scarcely any perceptible extent the cause of variations of this sort. Tenants-at-will can easily be found better off than the petty proprietors, although the tenants-at-will pay rent plus revenue, and the former pays only revenue.

I know of no conditions of tenure which might be changed with advantage; our settlements are of recent date; the assessments are moderate, the country is highly prosperous; we should now be watchful, but should not disturb men's minds by anticipating or mooted changes of tenure. I am sorry to see the joint proprietors of villages so often resort to partition.

BERAR.

Mr. Dunlop.

In Berar we have the Bombay ryotwari land tenure system. The following description of it by Mr. A. C. Lyall is taken from the "Berar Gazetteer":—*

"The English Government has now (1869) placed the tenure of land in Berar on a stable foundation. After some hesitation (for a settlement on the Northwest Provinces model was first actually ordered) the Bombay system of survey and settlement according to the fields has been adopted. The whole country is being surveyed, marked off into plots, and assessed at rates which hold good for thirty years. Subject to certain restrictions, the occupant is absolute proprietor of his holdings, may sell, let, or mortgage it, or any part of it, cultivate it or leave it waste, so long as he pays its assessment, which is fixed for the term of the settlement (usually thirty years), and may then be revised only on general principles, that is, the assessment of an entire district or village may be raised or lowered as may seem expedient, but the impost may not be altered to the detriment of any occupant on account of his own improvements.

Of the restrictions on this principle some are intended to guard the rights of Government, and to check the tendency to excessive subdivision of land, the chief defect of a peasant proprietary system, and the rest to protect the interests of persons other than the occupant who may have an interest in the holding.

* Land tenures by cultivation occupancy.

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First, if an occupant wishes to do anything which will destroy the value of his land, as to quarry in it, he must apply for permission to do so, and pay a fine to compensate Government for the prospective loss of assessment. Secondly, not less than the entire assessment of each field is to be levied. If, consequently, one share of a field is resigned, and the other sharers will not take it up themselves, nor get some one else to do so, the whole field must be resigned. Thirdly, a share field once resigned must be taken up again as a whole, and no further subdivision of shares, after the settlement is once made, is permitted.*

An occupant may always resign his holding (or any portion of it, being an entire field or distinct share in one) by simply giving a written notice of his intention before a certain date, which frees him of all liabilities from the current year. When the registered holder alienates his estate he does it by surrender and admittance, like an English copy-holder. Indeed, the Berar occupancy tenure has many features resembling the copyhold estate in the reservations of manorial rights.

Thus, in fifteen years, the Berar cultivator has passed from all the evils of rack-renting, personal insecurity, and uncertain ownership of land to a safe property and a fixed assessment. Yet we should remember

* Part of this brief abstract of the Bombay system of settlement is taken from the "Indian Economist."

that this contrast between the two administrations, which cannot now fail to strike the generation which remembers the assignment of 1853, would not have much impressed the foregoing generation if the country had been transferred thirty years earlier. The Berar cultivator is lucky in that he came under British management at a time when our Government had sown its wild oats and reaped the fruits thereof; when we had drained the slough of fiscal blunders and blind carelessness in which our Collectors had been floundering, and had placed them on the firm and fertile ground of method and moderation. It would be dangerous to assert that the agriculturist under the rigid, irresistible, unconscious maladministration of the early English school was even so well off as under the conscious haphazard misrule of the native government, which was kept elastic by the possibility of evasion or revolt. This rigid irresistibility is probably the prime cause of our mismanaging (as we constantly do) the land revenue of a new Province during the first years of our administration. Even in 1853, when the Nizam's talukdars had in North Berar made over to us a squeezed orange, we began by attempting to collect the extraordinary rates to which the land revenue demand had been run up by our predecessors, whence it may be guessed that the agriculturists did not at once discover the blessings of British rule.

On the other hand, there are some reasons why cession to the British should have been more popular in Berar than it usually is found at first to be. Peaceful, cultivating communities, living on a dead level of humble equality under strong tax-collectors, got none of those compensations which indemnified the Rajput clansmen of Oude for chronic anarchy, and complete public insecurity. Rough independence, the ups and downs of a stirring life, a skirmish over each revenue instalment, faction fights for land affording a good working title to the survivor, all these consolations were unknown to the Berar Kunbi, nor would they have been to his taste had they been within his power. He had as much land as he wanted without quarrelling with any one; all that he desired was secure possession of the fruits of his labour, and a certain State demand. The classes which lost by the assignment of Berar to British administrators were those who had hitherto made their profit out of native administration, the talukdars, the farmers of any kind of revenue, and the hereditary pargana officials.

The existing occupancy tenures of Berar may be thus classified. Land is held—

- (1.) By proprietors who manage each his own plot in his own family.
- (2.) By proprietors working together on the joint stock or co-operative system.
- (3.) By the *metairie*—halving the gross produce.
- (4.) By the *metairie*—halving the net produce.
- (5.) By money rents.
- (6.) By proprietors employing hired labour.

Land is now very commonly held on the joint-stock principle. Certain persons agree to, contribute shares of cultivating expenses, and to divide the profits in proportion to those shares, that proportion being usually determined by the number of plough-cattle employed by each partner. These shareholders have co-ordinate proprietary rights in the land. If you admit a partner without stipulation as to term, you cannot turn him out when you wish to get rid of him,

although you can dissolve the partnership by division of shares.

It is not always easy to distinguish proprietary shareholders from sub-tenants; but the partner is he who has put in a share of capital and stock on loan from the proprietor, and after accounting for all advances, receives a stipulated share of the net profit and of cultivation. If the sub-tenant has subscribed any capital, that transaction is adjusted separately.

The *batai* sub-tenure (*metairie*) was formerly, and is still, very common in Berar. These are the ordinary terms of the *batai* contract; the registered occupant of the land pays the assessment on it, but makes it over entirely to the *metayer*, and receives as rent half the crop after it has been cleaned and made ready for market. The proportion of half is invariable, but the *metayer* sometimes deducts his seed before dividing the grain. He (the sub-tenant) finds seed, labour, oxen, and all cultivation expenses. The period of lease is usually fixed, but it depends on the state of the land. If it is bad, the period may be long; but no term of *metairie* holding gives any right of occupancy.

Metairies are going out of fashion. As the country gets richer, the prosperous cultivator will not agree to pay rent of half the produce, and demands admission to partnership.

Money rents are also coming into usage slowly, mainly, I think, because the land now occasionally falls into the hands of classes who do not cultivate, and who are thus obliged to let to others. The money-lenders can now sell up a cultivator living on his field, and give a lease for it; formerly they could hardly have found a tenant.

Many persons now hold substantial estates, particularly in the Berar valley. These are usually village or pargana officials, who have had good opportunities of getting hold of the best fields. Several could be named who are registered occupants of 300 and 400 acres, and a few have larger holdings rated at Rs. 1,000 or upwards of land revenue. It may be affirmed, however, that in almost all instances the land is really possessed by a family of shareholding kinsmen, who assist in the management and divide the profits, not, as in England, by a single proprietor. The large landowners farm most of their fields by hired labour, providing seed and plough-cattle, though, where the lands are scattered in different villages, they are often leased out. The rate of wages of farm labourers is as high as Rs. 8 monthly* in the centre of the vale along the railway; in the more backward tracts it falls to Rs. 25 or Rs. 40 yearly, with food and clothing beside. Further down south the labourer still gets a share of the produce only.

The British Government introduced in 1865 a system of leasing for 30 years uncultivated villages upon terms which fix a rental rising gradually with the spread of cultivation. At the expiry of this period, the lessee will be proprietor of the whole estate at the full assessment; or he may refuse to engage for the total area, when he will subside into an ordinary Patel.

Government deals only with the registered occupant or Khateedar, and we have no returns to show the area cultivated under each of the occupancy tenures referred to above.

* The rate has since fallen.

7. In judging of the replies submitted from this Province, the Famine Commission should remember that, compared with Provinces settled on the North-Western Provinces system, we labour under the disadvantage that we have not at our disposal the great store of information regarding the economic condition of the people which in such Provinces settlement officers accumulate.

To take, for instance, question 9, our survey officers do not, as a rule, prosecute the inquiries to

which this question points. The Berar settlement was fixed by officers who admit that they knew little or nothing—

- (a) of the rental of land, i.e., of its letting value; or
- (b) of its produce.

The rates determined on were deduced chiefly from the history of past collections, and from the general circumstances of each tract. The minute and careful

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classification of soils required by the Bombay system* to some extent takes the place of inquiries regarding produce; and I am not at all sure that the Bombay officer does not, with his somewhat empirical methods, arrive at results quite as good as those which the Bengal settlement officer arrives at after difficult research. The one thinks of *fields*: the factors which enter into his calculation are few and simple, and, more than all, his calculations are subjected to an instantaneous self-acting test, viz., whether the cultivators keep in their fields or throw them up. The other thinks of *estates*: has to balance wide-ranging probabilities, and his errors are often undiscoverable till years have passed. It is no wonder that the Bengal settlement officer is impelled to inquiries far more minute and intricate than those with which Bombay officers concern themselves. But what I would point to is that, whatever the direct result of such inquiries may be, their indirect value is very great; for a settlement on the Bengal principle leaves behind it a mass of information regarding the economic condition of the people which a Bombay settlement does not, and which in practice is never afterwards supplied. My object is not to show that our system is bad, and the other good. All I am concerned to notice is that the Bengal settlement officer is, by the nature of the case, impelled to make inquiries which the other is not, and that he leaves behind him information which makes the reports of Bombay settlement officers seem *jejune*† and barren.

Had our settlement reports been fuller, the reply to question 9 would have been much more complete than it actually is.

8. In a preceding paragraph I remarked that Berar presents opportunities, which are perhaps unique, for the prosecution of some of the inquiries which the Famine Commission have in hand, and I gave an instance.

I might have added that the Commission can here learn what the economic position of the ryot is, when he enjoys the whole produce of his labour (excepting of course the Government share), is perfectly unfettered, and has worked under favourable circumstances. There are, no doubt, parts of the Bombay Presidency where circumstances have been even more favourable than in Berar; but, then, those tracts are probably too unlike the rest of the country to be of the highest value as standards. Here, nothing has been exceptional, though everything has been favourable.

9. The example of Berar is of further interest as illustrating the recuperative powers of a tract which had revenue administration and political unrest had brought into very bad case indeed.

In I think the latest of his well-known works Sir H. Maine throws out the suggestion that a revenue system such as ours is less capable of making energetic and successful efforts in extending cultivation than one in which large properties are the main feature. The theory may be true, but certainly the rapid advances which Berar has made since we took it over is a fact not undeserving of weight on the other side.

10. I should expect, too, that examination of the transactions of the Currency Office at Akola might be subjected to examination with much prospect of useful result. The fluctuations in its cash reserve are enormous, and, as they are produced by Berar trade only, are the reflex of monetary movements affecting the population at large.

11. Our cotton markets‡ again offer to us information of the greatest value; for we can learn there with

accuracy the dates on which the crop from the proceeds of which the land revenue is chiefly paid is turned into money; and if we only take the trouble to distinguish between cotton brought to market by cultivators themselves and that consigned by traders, may also obtain a measure, not very complete, but so far as it goes very accurate, of the steps by which the cultivating classes emancipate themselves from the hands of the Banya class.

12. The quite exceptional opportunities which I have had of becoming acquainted with, and comparing the settlement and revenue systems of the east and west of India may perhaps justify my adding a few further remarks regarding their relative merits and defects, so far as they affect the questions with which this note is concerned. To one weak point in the Bombay system of settlement I have already adverted. Another is, that it does not appear to leave behind it the same trained and experienced staff of officers which the Bengal system does. The point is one in which Berar may be peculiar; and I may therefore be mistaken. But so far as I know, there is in the Bombay survey nothing between the European superintendent and his assistants, and purely ministerial officers on low pay. The class of officers who, on the termination of settlement in the east of India, become tahsildars, extra assistant commissioners, or deputy collectors is entirely wanting. In Berar at this moment though the settlement terminated only a month or two ago, there is not a person, European or native, above the rank of a clerk on Rs. 24 or so who has had any settlement experience. And as far as appears this state of things will last for the next 20 or 30 years; and during all that time revenue administration will be in the hands of men who will lack the invaluable training which settlement work gives, and whose tendency will be to regard revenue work as something less important and less interesting than the decision of civil and criminal cases.

13. As an administrative instrument, the Bombay revenue system is, I consider, immensely superior to that of Bengal. The efficiency of the village officers here is marvellous. In the Central Provinces, a good district officer could do much on the occurrence of a crisis like a famine with the help of malguzars; but it is difficult to say what the same officer here in Berar could not do. So far as I can see almost anything might be accomplished. I was some years ago Deputy Commissioner of the Wurdha district of the Central Provinces, on the left bank of the Wurdah river; I am now in the Amraoti district in Berar, on the right bank. The very men who are malguzars in Wurdah are patels here. It was merely through an administrative accident that our patels were not also made malguzars. I have been immensely struck with the difference in the power of handling the two classes which the deputy commissioners of Wurdah and Amraoti possess. The Wurdah malguzar is, I believe, as well disposed and as amenable to advice and as willing to aid as any person of his class anywhere; but his good dispositions by no means make up for the absolute power which the Deputy Commissioner here has over his patels. These men, though often wretchedly paid, cling to their office with, as far as I can see, just as much tenacity as a malguzar clings to his estate; and the knowledge that the least supineness or neglect would in a crisis cause their watan to be transferred to another would excite them to the utmost exertions. How long this state of things will last I do not venture to predict. Under our rule, and in spite of all we can do, these grand old village officers may lose their prestige; but certainly, considering his resources and emoluments, the patel of Berar is at present a much more useful public servant than the village proprietor across the river, and would be a more trustworthy administrative agent in a crisis.

14. On the question whether cultivators here are better off than cultivators in the Central Provinces, I scarcely like to venture an opinion. I am inclined to think that they are decidedly better off than the

average* cultivators in the Central Provinces, and that they are more independent and far less likely to go down in the world as cultivation advances and population augments. But it must be admitted, on the other hand, that the number of persons (I am speaking of agriculturists only) who live in what is for them some luxury, and whose example may perhaps tend to raise the standard of living among the whole population, is smaller here than there. It must be remembered also that one is apt in talking of Berar cultivators, to think of the khotidar only; and that information regarding the number of co-sharers and sub-tenants, and the condition of, and the rents paid by the latter is deficient. Hence I do not like to be confident. It is a curious fact that in the Central

* There would be little use in comparing the Berar cultivator with merely the privileged classes of cultivators in the Central Provinces.

Provinces, with its malguzari settlement, statistical information regarding the lowest classes of tenants is more complete than it is here. The Bengal system, justly apprehensive of oppression by landlords, insists on full information in the annual village papers regarding tenants of all kinds. The Bombay system, thinking that it has done enough when it has looked after the field owner, does not much attempt to penetrate to the considerable and possibly increasing class beneath him. Yet this is the very information which would be perhaps of most value to the Famine Commission; for it is on the lowest class of tenants and the class of agricultural labourers that the stress of famine first falls.

15. This leads me to remark that I trust that the Commission will recommend that, when the next census of India is taken, the class of agricultural labourers shall be carefully discriminated.

BOMBAY.

The tenures under Bombay may be divided into occupancy under the survey settlement, and proprietary, which includes political, service, and personal inams and religious endowments.

The only important variations from the ordinary occupancy tenure are the Khotas of the Concan, who are hereditary farmers, and the Narwadars of Kaira, who form village communities with joint rights, the Talukdars (Rajput proprietors) of Guzerat, and the Mulgars or superior holders in Canara. These as being all assessed to the Government land tax, are not included in inam, but they possess proprietary rights.

The number of Talukdari (Rajput proprietary) villages in Ahmedabad is 299. The area of similar estates in Broach is 47,017 acres (shares of villages). The Khotas hold 607 villages in Ratnagiri, and 166,181 acres in Colaba, and the Narwadars 70,750 acres in Kaira. All these are included as assessment-paying holdings.

The Collectors offer the following opinions on the latter part of the question.

Surat.—The Collector does not consider that the inhabitants in inam villages are better off than those in our own, except that in time of scarcity, the owners of the villages have time to inquire and means of knowing how far each man can be pressed to pay, and not press him when he cannot pay.

Khandesh (Mr. Propert).—Does not consider inam villages in Khandesh more prosperous than Government villages, and thinks intelligent Government ryots better off than inamdars. Does not think that any changes in the present survey tenure would benefit the holders of the land.

Ahmednagar.—The difference in tenure (occupancy or proprietary) does not affect the economic condition of the holder.

Sholapur.—Mr. Percival thinks the 30 years' leases too long, and that there should be a settlement every 10 years, with an engagement on the part of Government not to raise the rent of fields more than 35 per cent.

Kaladgi.—As a general rule the holders of inam lands, and especially the larger ones, are persons of some position. Their economic position is therefore superior to that of occupants of Government lands. The holders of the smaller inams are in no better condition than the holders of like areas of Government land. The present tenure suits the people and no change is desirable.

Canara.—The muli tenure is proprietary, the holders being Múlgárs. Their tenants are of two kinds. Mulgenidars who have a permanent transferable right, and chálgenidars who are tenants at will. No opinion offered.

Ratnagiri.—The Collector says—In this zillah there are 1,337 villages, of which 607 are held on the *khoti* tenure, 210 are *dhurékari*, and 397 are *kitchri*, or partly *khoti* and partly *dhurékari*. The rest are *khalsa* or *inám*.

The *khoti* tenure may be thus described. A superior holder, or a coparcenary of superior holders, possesses the hereditary right of settling with Government for the revenue in the gross. The khoti, or the different members of a khoti coparcenary, usually hold and farm a small portion of the village lands themselves. The rest of the lands are sublet to tenants, most of whom are privileged tenants, or tenants by prescriptive right, who cannot be ousted so long as they pay the customary, or if agreed, a fixed proportion of the crops to the khotas. The standing crops are annually inspected and the out-turn appraised by the khotas. Only about five per cent. of the tenants are now tenants-at-will, and pay rack-rents, also in kind.

The *dhurékari* tenure may be thus described. A *dhurékari* holds his land hereditarily direct from the State, and pays his assessment in cash.

In a *kitchri* village, where both tenures prevail, the *dhurékari* pays his cash assessment to the khoti, who is bound to collect such assessment, and should a *dhurékari* throw up his holding it lapses to the khoti, who in any case has to pay the revenue. Inasmuch, however, as the area of cultivable land is now far less than is required for the population, *dhara* land is now never thrown up.

The khotas and khoti coparcenaries, therefore, have a direct hereditary interest in the prosperity and improvement of their villages, and by consequence in the welfare of their cultivators, most of whom, even if they fail to pay their rent, cannot be ousted except by a tedious civil suit.

The khotas, therefore, are the grain-dealers of their villages, and in a great measure occupy the position of the sowkars of the Dekkan villages, with the important restriction on rapacity that it is their interest to keep on good terms with, and to support, their old tenants.

In *kitchri* villages a *dhurékari* is often also a privileged tenant of khoti land in the village.

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The following are the chief tenures—inam, miras, survey occupancy. This latter is the chief or principal tenure. The holder has nearly all the rights of a mirasdar, excepting that the latter can after years of absence come back and reclaim his land.

No right can be more secure and more full than that of a survey occupant. It is so well known as scarcely to require description from me. Briefly it may be said that he holds the land so long as he pays the Government rental. His lease is a 30 years' lease. On the expiry of his lease he cannot be ousted, but can of right remain on if he consents to the revision settlement. The increase at the revision settlement is not settled independently for his land or holding, but is a per-centage on that of his village or of a circle of villages, and depends on the rise in value of produce, the opening up of the country by roads and railways, and such like causes. His improvements are not considered and made a ground of raising his rent. He can sell, mortgage, or sublet this land without requiring any consent from Government. In fact he is virtual proprietor subject to a quit-rent varying every 30 years. If Government requires any portion of his land for a road or other public purpose, he can claim compensation, and if he decline to part with his land, Government can only secure the land under the provisions of the Land Acquisition Act.

The full freedom of transfer has, in my opinion, been most injurious to Government, and has been the real cause of the present impoverished condition of the Deccan ryot.

In paragraph 4 of letter No. 2202, dated 6th April 1877, addressed by the Chief Secretary to the Government of Bombay to the Secretary to the Government of India, it is observed:—

"Formerly land in the Deccan was not the property of the ryot, and the ryot's credit was limited. The money-lender, therefore, advanced money with a stinted hand, and for some years after the conquest of the Deccan in 1818, seldom thought of having recourse to the civil courts to recover his debts, but was contented with taking all the ryot's produce, and leaving him only the bare necessities of life. This state of

things attracted attention as early as 1822, and from time to time the misery of the ryots and the danger of it to the State was represented to Government. From 1836-37, however, the land began to be settled on terms which gave the ryots a proprietary title in it. Soon finding the value of this, they began to borrow money upon it, thus to live on their capital. At first the power of selling the land for money debts, a power unknown to native governments, and foreign to the feelings of the people, was not exercised by the money-lenders. As soon, however, as the system of civil justice, introduced by the British, began to be better understood, and the ryots were getting to the end of their capital, suits became more frequent and the people became familiar with sale of land for debt."

This very great concession made to the ryot without urgent need or reason, has, in place of bringing prosperity, carried distress and disaster in its train. I consider if we care for the ryot, if we care that the cultivator, the stay and backbone of our rule, shall be happy and prosperous, we must retrace our steps, undo the evil we have done, and while still securing to him all his other rights, must deny to him the right of either subletting or mortgaging his land. In short, Government should only accept cultivating tenants.

I noticed, when the revision settlement of the Dharwar Collectorate was being made, that since the introduction of the survey upwards of 25 per cent. of the land had fallen into the hands of non-cultivating occupants, persons who held the land at the small Government rental, and sublet it at rates three or four times higher than the Government rate. Thus as regards lands held by non-cultivating occupants, all the benefits of the survey settlement are lost to the poor actual cultivator.

As the case stands, a class of grasping men who were never intended to reap the benefits of our low assessments, now secure those benefits; they rack-rent the ryots for whose benefit the low assessments were introduced, and when the ryot complains of his miserable condition, teach him that it is all due to the heavy assessments imposed by Government.

ryots notwithstanding gain by obtaining a security of tenure which they did not possess before.

I do not think there is any material difference in the condition of the petty enamdar and that of the Government ryot. The ryots in enam villages and in jaghir territory are certainly in an inferior condition of prosperity to those in the Government villages.

As regards any change in relation to unrestricted freedom of transfer of land, it has during recent years become a question whether it would not have been better in the first instance had some check been placed upon entirely unrestricted transfer, but having once been granted by law, it is difficult to see how it can be now withdrawn. I doubt much if any checks which could have been imposed even in the first instance would not have been practically evaded, and whether on the whole they would not have done more harm than good.

should be tenants of private landlords, a larger proportion of the population would engage in commerce and manufactures, and the aggregate production and wealth of the community would be increased.

Now, there are two Bombay districts in which the khoti tenure prevails, in Ratnagiri, almost entirely; in Kolaba, to the extent of about half the district. Under this tenure, the actual cultivators are tenants (some customary, some at will) of the khotis, or village landlords.

For comparison with these districts as regards the proportionate numbers and wealth of the trading and manufacturing classes, I have selected the three

poorest Deccan districts. With the exception of the city of Poona, neither of the tracts under comparison contains any large cities. Neither raises any very large quantities of exportable produce. If anything, the advantage in this respect is with the Konkan, which exports by sea a good deal of rice and wood, while the part of the Deccan selected grows hardly any cotton. Neither tract is remarkable for fertility; but the Deccan soil and climate is very unproductive. The climate of the Konkan tract is favourable to production, and it contains a good deal of very fertile land. The Deccan tract is far inland, cut off from the sea by the Ghâts, and Sattara and Nagar are not traversed by a

railway; while the Konkan tract has numerous ports, affording easy and cheap water communication with the great mart of Western India, Bombay, and all trade between the Southern Deccan and the sea passes through it. The Deccan tract has recently suffered severely from famine, the effect of which must have been seriously to diminish the resources of its traders. For these reasons one would, I think, expect to find that the advantage as regards proportionate numbers and wealth of the manufacturing and commercial classes would be with the Konkan tract. The following table, however, shows that this is not the case:—

DISTRICT.	Total population by census of 1872.	Adult male trading, manufacturing, and artisan population by census of 1872, i.e., population assessable under the Act.	Number of those entered in column 3 who have been assessed to license-tax.	Assessment to license-tax.	Proportion of assessable (column 3) to total population; per cent.	Proportion assessed to assessable, i.e., proportion of column 3 having incomes of Rs. 100 a year and upwards.	Rate of tax per head of column 4, being 2 per cent. on the average assessed incomes
1	2	3	4	5	6	7	8
Ratnagiri -	1,019,136	56,000	8,241	Rs. 43,388	5.2	15.4	Rs. 5.16
Kolaba -	350,405	15,289	5,929	34,250	4.3	38.8	5.97
Nagar -	773,938	48,707	12,446	77,214	6.3	25.5	6.20
Sattara -	1,061,002	61,137	19,823	1,11,755	5.8	32.4	5.64
Poona -	907,235	64,175	22,268	1,33,245	7.1	34.6	5.98

These figures tend (I need not say that the inference from an induction so incomplete as this must be accepted with caution) to show that, on the whole, under the khoti tenure, as compared with the very poorest ryotwari or peasant proprietary districts, the trading, manufacturing, and artisan proportion of the population is smaller; that it is generally poorer, and that it comprises fewer well-to-do people; and that the difference in these respects is more marked in the district where the khoti tenure prevails most exclusively.

With regard to the latter portion of question 10, I would state briefly that with the Bombay settlement on peasant proprietary tenure, under which by far the greater part of the land of this Presidency is held, land can be transferred without any restriction, and more easily and cheaply than in any civilised country I know of. Unrestricted freedom of transfer is a product of British law and administration, since strict hereditary entail of landed property was the rule of Hindu law, and the practice till after the introduction of British rule. In my humble opinion we have erred in making the change; it has, in conjunction with our

system of administration of civil justice, greatly facilitated the loss of their patrimony by the land-owning and peasant classes; and this has caused grave discontent among those the most important, most valuable, and most peaceful orders of the community. It has tended to frustrate the efforts of Government to improve their condition by measures intended to give greater security of tenure, to limit and regulate equitably the State demand on the land, and the like. And, so far as I am aware, it has been attended by none of the social or economical advantages which were anticipated from it. In this, I think, we adopted principles recently established after long discussion in England, without duly considering how different are the circumstances of the two countries; that India is centuries behind England, and that it is very doubtful whether the abolition of all restrictions on the transfer of land would not have been a century or two ago a premature and mischievous measure in England.

But whether we can now retrace our steps with due regard to the interests we have created without doing more harm than by maintaining our present policy, is a question which requires very mature consideration.

SINDH.

The agricultural class in Sindh comprises holders of land, large zamindars, and peasant proprietors, all enjoying proprietary rights, and tenants-at-will. The proportion of land cultivated by tenants-at-will is perhaps three-fifths of the whole. As might be expected, such tenants are bad cultivators, and their condition is a poor one. With very rare exceptions the practice is for the tenant to pay a share of the produce, one-third to three-fifths. He has no inducement to increase exertion or improve his husbandry, and he seldom rises—or cares to rise—above a mere hand-to-

mouth existence. The class containing the greatest number of prosperous agriculturists is probably that of holders of 30 to 50 acres, who are themselves cultivators, though undoubtedly this could not be said if the large holders as a class possessed the virtues of thrift and industry. The few who are prudent and diligent managers of their property are in very comfortable circumstances, and some are reputed to be wealthy. I should hesitate to interfere in any way with the conditions of tenure.

CHAP. I. QN. 10.

BOMBAY.

Mr. Pedder.

SINDH.

Col. Haig.

Col. Anderson.

All land in the south of the Bombay Presidency, in Berar and in Mysore, is held on one of two tenures under Government by the survey settlement, "enam," or entirely or partially free from land tax, or "Government," that is, paying full land tax heritable and transferable and retainable undisturbed so long as the land tax for the time being is paid. This is subject to revision at 30 years' intervals. Enam lands are of two kinds, plots or fields of varying sizes in Government villages, and whole villages of which a considerable proportion exist throughout the southern half of Bombay, a full 20 per cent. of the total villages. The enamdar ordinarily exacts higher assessments than are paid on Government lands. In a large proportion of cases these villages have been, at the request of the enamdar, settled, but it is commonly necessary to impose rates higher than in adjacent Government villages to secure his consent to the settlement. The

Mr. Pedder.

With reference to this question, you will doubtless have very full information regarding tenures from the different Collectors, and I need not touch on them. But there is one point on which the inquiries I have lately been making in connexion with the license tax appear to throw some light.

It is very often argued that, whatever advantages the ryotwari system of tenure prevalent in this Presidency may have, it tends to keep the people at a dead-level of poverty, to confine them to agriculture for their means of living; and that, with another system of tenure, one under which the cultivators, instead of being proprietors paying assessment to the State,

CHAP. I. QN. 10.

MADRAS.

The Board of Revenue.

"to meet it. That State felt it first, felt it most severely, and is last involved in it, in spite of excellent European supervision and Government funds."

Are there any conditions of tenure (such, for instance, as unrestricted freedom of transfer) which might be changed with advantage to the holder and without injury to other parties?

All Collectors who make any reference to the specific instance adduced in this question unite in deprecating any interference with freedom of transfer, and in this the Board concur. Many Collectors recommend legislation to secure occupancy right to the ryots in zamindari, shrotriems, &c. As already stated above,

this question is under the Board's consideration. It may now be remarked, however, that any recommendation the Board may make will be with the view of removing uncertainty with regard to existing rights rather than of introducing changes.

The practice of allowing compensation to temporary tenants for improvements effected with the knowledge of the landlord reported as prevailing in Malabar and to some extent in Canara is one which it might be well to secure by legislation to tenants throughout the Presidency, but the matter is one which calls for much consideration in detail, and the Board are not at present prepared to do more than offer a suggestion.

MYSORE.

MYSORE.

The tenure of the district is ryotwari, which may be described as a sort of perpetual leasehold, with the further advantage that the ryot, when compelled to do so, can resign his lease without any penalty or loss. It has been objected to this system that it subdivides the land too much, encourages a class of petty ryots who almost live from hand to mouth, and the like. This is true in a limited sense, but on the other hand it has raised up, and is still raising up, a large body of independent and frugal men whose conduct throughout the famine has been marvellous. Uncomplaining, and, as a rule, law-respecting, they were reduced to fearful straits, and subsisting almost on nothing, they managed to keep themselves and cattle alive; and, with their carefully-hoarded small stocks of seed grain, were in a position again to till the ground as soon as seasonable rain fell, thereby assuring, it is trusted, not only comparative plenty to themselves, but a fair land revenue to their paramount

landlord—the Government. This sturdy independence and self-denial are surely begotten of their quasi-proprietorship with all its binding traditions and religious observances, and thus true husbandry and its concomitants of frugality and perseverance have taken deep root and developed a class of ryots who, in an economic point of view, are probably not to be surpassed in India. There are probably individual classes elsewhere who may be noted for more intelligence or more industry, but as a mass the Mysore ryots are the backbone of the country, and be it noted that it is the tenure that has made the provident ryot, and not the ryot who has developed the tenure. Instinctively almost it occurs to the ryot to foster in every respect and to protect his rights and interests in matters of grazing, fuel, and wood, &c., for what benefits him benefits the Government, and he is not slow to acknowledge his obligation where he has the ability to discharge his Government dues to the last anna.

RAJPUTANA.

RAJPUTANA.

Dholpur.—Lieut.-Col. Denney.—The tenures in Dholpur are to a great extent similar to those which existed in the North-Western Provinces when British rule was first established.

The ownership of all the land is vested in the State, which claims the power to eject the zamindar, although practically this power is never exercised as long as the State demand is regularly paid.

The State also possesses a right to the waste land within the boundaries of each village, in excess of what may be required for the grazing of the village cattle.

The zamindar is looked upon as a cultivator with rights of general management, and a portion of the rental is allowed to him for the trouble of collection.

Under the new settlement the proportion thus allowed to zamindars averages 24 per cent. on the land revenue of the entire State.

Tenants have no acknowledged rights either of occupancy or of holding at fixed rates. Practically, however, they do hold at well-known and long established rates, and in a thinly populated State they are so much in demand that they are not subjected to much interference in their holdings.

Transfers of land to outsiders are not usual; shares which are sold, either on account of failure of the possessor to meet the Government demand, or from other causes, are generally taken up by some of the other sharers in the village community or by relatives in neighbouring villages.

Kotah.—Major Powlett.—Paragraphs 10 and 14.—In Tonk proprietary right seems to be recognised; for holders can sell their land, and ryots absent for years are allowed on their return to re-occupy their lands.

* Vide a very interesting foot note to be found in Chap. VIII. *Annals of Haraoti.*

CHAP. I. QN. 10.

RAJPUTANA.

Major Powlett.

	Good well-land.	Unirrigated average land.
Tonk	Rs. 10	Rs. 8
Boondee	15	12

In Tonk, where land is sold, the saleable value is, I am told, about double the mortgageable.

In Boondee, judging from inquiries made in two localities far apart, from one-fourth to one-fifth of the land is mortgaged, chiefly to money-lenders.

CENTRAL INDIA.

CENTRAL INDIA.

Mr. Wingate.

Bhopal.—Each village is in charge of a lumberdar appointed for 20 years, who distributes the land among the cultivators at a fixed Government rental on which he gets 10 per cent. commission from the State. Land cannot be transferred from one cultivator to another, so long as the occupier pays the Government rental.

Baghelkhand.—"As has been said before, there are no proprietary or occupancy rights in Baghelkhand, the sovereign of the State being the sole proprietor of such.

"In the Kothao or Khalsa villages, which form about one-third of the total number in the State, both in jumma and cultivated land, leases, as a rule, were given from year to year, in order to prevent any such rights being established. Nearly two-thirds of the whole of Rewah (and the same is applicable to the rest of the district generally) is held rent free under the following tenures:—

"1. Paipakhar, rent free grant to Brahmans and priests.

"2. Murwar, rent free grant for loss of life in battle.

"3. Birt, rent free grant for good service.

"4. Rajbhog, rent free grant for temple endowments.

"5. Jaghir, rent free grant in lieu of pay, but is liable to exchange and resumption.

"6. Muamla, grants to the brotherhood, subject to a payment of one-fourth of the jumma of the village."—Lieut.-Colonel Bannerman.

Rullam.—"The revenue settlement in this district is periodical. The existing settlement is for 15 years. The actual jumma of each cultivator is settled, and during the term of the lease no one can demand from him more than the stipulated sum, whatever may be his improvements. Every village is also given in

ejara to the patel of that village, allowing him a reduction from $7\frac{1}{2}$ to 10 per cent. from the gross jumma he is to collect from the cultivators of his village as a compensation for his responsibilities and supervision, besides a rent free plot of culturable ground varying according to the size of each village from 25 to 200 beegahs. He is responsible for the well-being of his village, as well as the full payment of the State revenue whatever may be his own receipts, but he is very seldom a loser. No one has power to make any alteration in the stipulated tenure without the consent of the State. The character of the tenure is favourable and the settlement mild, and therefore popular. The agriculturist having the right of enjoying the profit of his produce and improvements fully."—Mir Shahamat Ali, C.S.I.

Manpur.—"In seven of the villages of the pargannah, cultivators, called malgoozars, hold their estates under a twenty years' settlement, which was made in A.D. 1867. They are individually and collectively responsible for Government revenue, and enjoy the right of sub-letting the waste land in their possession on their authority or on rates they think fit to fix within the rates authorised by the settlement. They are thus free to enjoy all the profits which increased or improved cultivation in their villages may bring about. In the remaining unsettled villages the cultivators enjoy no rights, but that by usage they cannot be dispossessed of their holdings as long as they continue to pay Government revenue regularly. The malgoozars of the settled villages are alone recognised to hold proprietary rights, but in no case has any cultivator in settled or unsettled villages ever attempted to exercise the right of transfer by either mortgaging or selling the fields held by him."—Pundit Suroop Narain.

CHAPTER I.—QUESTION 11.

CHAP. I. QN. 11.

Are the holders of the above tenures in the habit of carrying out material improvements, such as digging wells or channels, necessary in order to use the water in a canal? Are their actions in this respect affected most by the security or insecurity of their tenure, or by their wealth or poverty? Or are there any other reasons which hinder such investments of their labour and capital? What have been the effects of recent Land Improvement Acts? Have they tended to enlarge or narrow the making of advances by Government? Does the condition of the country render it desirable that the operation of these Acts should be facilitated, or their scope enlarged, and are there any apparent difficulties in the way of doing this that could be removed? Is the demand for interest on Government advances obstructive or prohibitory?

PUNJAB.

PUNJAB.

Mr. Gore Ouseley.

The owners of land, and in some places occupancy tenants, do carry out the material improvements enumerated in the question. Their actions in this respect are affected chiefly by their pecuniary means and by the degree in which they possess provident habits. Many wealthy landowners squander their means without bestowing a thought on improving their estates. The effect of the Land Improvement Acts has tended

to enlarge the making of advances by Government. The provisions of the Acts afford, I think, all due facilities, compatible with the safety of the advances made, for their being easily obtained. During the present year special advances to the amount of Rs. 1,80,000 have been made in seven districts only. The rate of interest is, I think, sufficiently moderate.

CHAP. I. QN. 11.

Col.
W. G. Davies.

First as regards proprietary tenures.—There can be no doubt whatever that village communities and individual proprietors are in the habit of making material improvements. This is well known to all who have had any revenue experience in this part of India. To obtain particular information as to what had been done in this way in Karnál and Gurgaon I addressed the Deputy Commissioners of those districts. Mr. Ibbetson regarding Karnál writes as follows:—

“During the 35 years since last settlement about 300 masonry wells have been built by them (the proprietors); moreover, almost the whole system of canal distributories, which up to within the last 3 years irrigated more than 1,00,000 acres, has been created by the people with such small assistance as the remains of old water channels afforded them.”

Mr. Roberts writes with regard to Gurgaon that the settlement operations have lately retarded the investment of money by the proprietary classes in improvements, but that since the announcement of the jamas applications for Takávi have commenced pouring in, so that between June 1877 (when the new jamas were given out) and 1st April 1878 applications to the amount of Rs. 17,325 had been received, of which Rs. 14,000 was paid and the rest would be provided for out of the current year's allotment.

There can be no doubt, I think, that security of tenure has most to do with the investment of capital in improvements in the case of tenants; for tenants-at-will never, I believe, incur expense in sinking wells

or other irrigation works, and tenants with rights of occupancy only to a very limited extent, though the law (sections 37 and 38 of the Punjab Tenancy Act) seems to recognise a right on their part to improve the land in their occupation. In the case of *proprietors*, their tenure being absolutely secure, their wealth or poverty has more to do with the decision of the question of whether they shall lay out money in improving the land, than the nature of their tenure.

It is difficult to say what have been the effects of the Land Improvement Act. Before a sound opinion on this point could be given a special inquiry would have to be made, including a collation of the statistics of the number and amount of the advances made under the old and new rules. My impression is that at first, notwithstanding the more liberal terms as to the repayment of advances under the Land Improvement Act, the number of applications for advances made after its promulgation fell off very considerably. This, however, was not due, in my opinion, to the demand for interest so much as to the cumbrous and rigid nature of the rules issued under it, which require so many forms to be gone through before the advance can be made, and compel repayment with such stern exactness. If we wish to encourage the taking of advances we must simplify the rules and render them more elastic by giving power to the local authorities to relax them where necessary.

It is unnecessary here to enter into any detailed explanation of how this should be done.

serious risk of their destruction by floods or diluvion checks their construction. Except in these riverside lands, cultivation has followed the construction of the well or canal, not preceded it.

There is no law that I know of which checks the landowner's readiness to improve his land by digging wells, watercourses, &c. The expectation of having to pay increased revenue does check the making of such improvements to a considerable extent, when the term of a settlement is near its close. I have observed a decided suspension of such works during and immediately before settlement operations, and a sudden outburst of them when the new settlement was concluded. The fact that a new settlement is impending has a greater effect on such works than it ought to have, seeing that it is a rule of our revenue system that protective pattahs for terms of 20 years are granted by Government to constructors of new wells, and for 10 years to repairers of old wells and diggers of watercourses. As this rule becomes more thoroughly known, and as the confidence of the people in our really acting up to it increases, the effect of an impending settlement will greatly diminish.

4. Tenants are not in the habit of digging wells or canal watercourses; by the custom and feeling of the country it is the business of the landowner to sink a well or dig a new watercourse, and he also has to keep the well in repair, and in some places he does the annual clearance of the watercourse. As I said above, the making of the well or watercourse precedes the cultivation of the land, and therefore the occupancy of the tenant, except in the case of *sailába* lands, and a tenant of *sailába* land does not ordinarily hold enough land in one block to induce him to sink a well in it, and like the proprietors he is deterred by fear of diluvion.

Waste lands are often brought into cultivation by agreement between the landowner and other persons, whereby the latter bear the expense of sinking the well or digging the watercourse, and in return become owners of a half or smaller share in the land so cultivated. These contracts are locally known as *adhlap* or *taraddad-kári* agreements; they were formerly more common than at present, as the proprietary right has become more valuable, and the landowners are less and less willing to let it go out of their own hands.

I propose to write of the Mooltan and Derajat divisions, in which I have been serving as Commissioner of Settlements for the last six years, during which time settlements have been in progress in all seven districts of those divisions.

2. In the whole of this country (excepting parts of Bannu) the rain-fall is too small to admit of land being periodically cultivated with rain-water only; for all regular farming some other means of irrigation are necessary.

In the Trans-Indus country the torrents which flow after storms in the Suliman mountains flood the daman or high sloping plain along the edge of the hills; the low lands in the khadirs of the Indus, Sutlej, Jhelum, Chenab, and Ravi are moistened by the *sailáb* or floods from those rivers which occur between May and September.

These same floods fill the inundation canals which in Dera Gházi Khan, Muzaffargarh, Mooltan, and part of Montgomery, irrigate certain tracts which are out of the reach of the river floods, or which are artificially protected from such floods by embankments.

Wells are much used to supplement the *sailáb* in khadir lands; they are also almost always used to assist in the cultivation of land on inundation canals. Without wells such lands could only grow one kharíf crop, and even that might fail if the canal ran dry for a time.

In the Bár or Thal upland tracts, which occupy the centres of the Doábs between the great rivers, and which are out of the reach of floods or canals, wells are the only means of regular cultivation. But the profits of such cultivation by well alone are always small, and when two or more years of unusually small rainfall succeed each other, many such wells are thrown out of cultivation, ordinarily till better times come, but sometimes permanently. In some parts of these upland tracts the water is too far below the surface or too salt to be profitably used for irrigation.

3. The landowners in the country I am writing about are, of course, in the habit, so far as their means allow, of digging wells and canal watercourses. All the canals have, I should say, as many watercourses as they can properly supply, if they have not more. Wells are, as I have said, agricultural necessities in the upland and canal-irrigated tracts; in *sailába* or riverside lands they are not so very necessary, and the

It was also very common in former days for landowners to take a lump sum of cash called *jhuri* or *siropá* as a fine on institution, and in return for allowing a non-proprietor to sink a well and to hold the land attached as a sub-proprietor, subject to payment to the original landowner of nothing more than a small fixed quit-rent or proprietary fee. This is sometimes done even now, but the fine, which used to be light, is now heavy, in fact not much below the full market price of the land granted.

There is nothing in the law to prevent tenants from sinking wells or digging watercourses for the improvement of land in their occupancy; the Tenant Act allows them to make such improvements, and the Canal Act has clauses which facilitate the making of watercourses. But of course a tenant-at-will can practically do nothing without his landlord's consent, as the latter can stop his proceedings by serving notice of eviction, and in spite of provisions of the law the majority of occupancy tenants cannot afford to disregard their landlord's wishes.

But in this part of the country most landowners would be delighted to see their tenants make wells or dig watercourses in land not already provided therewith, if the tenants had the energy and capital to do it, and did not demand proprietary right or too great privileges in return. I do not think anything more can be properly done than has been done to facilitate the making of such improvements by tenants.

5. Where the State is the landowner, as it often is, of the waste lands in this part of the Punjab, I think that the present rules for the sale or lease of waste

lands are ill adapted to the country, if it is advisable to encourage the extension of cultivation and the digging of wells and canal watercourses in such lands. I have expressed my views on this subject in my review of the Montgomery Settlement Report, and in a letter forwarding to the Financial Commissioner Mr. Broadway's application for the lease of waste land in Jhang.

6. I have had nothing to do with the working of recent Land Improvement Acts, as I have been engaged in settlement work since 1864. In conversations which I have had from time to time with natives I have heard that few advances are taken. The mass of people are frightened by the prescribed formalities, and at the prospect of having to dance attendance at public offices; they also dread entering into agreements with so powerful a party as the Government. Under these circumstances the only men likely to apply for loans to Government instead of to the Saucars are, first, a few influential and intelligent men who feel that they need not be afraid of Government or its officials, and, secondly, unsafe men who cannot get credit elsewhere.

The difference between the rates of interest demanded by the Government and the Saucars will not tempt the mass of the people in the face of the other strong reasons which they have for preferring to deal with the Saucars. I think it would have a good effect in encouraging advances and in other ways if Government asked for no interest except upon arrears of instalments.

NORTH-WESTERN PROVINCES AND OUDH.

The question deals with two main subjects—1st, the practice of proprietary and occupancy tenure-holders in respect of carrying out material improvements, and the effect on such practice of the nature of the tenure and the wealth and poverty of the holders; 2nd, the operation and effect of recent Land Improvement Acts, and the necessity or desirability of altering them, so as to enlarge their scope and facilitate their operations. The first subject may most conveniently be treated by divisions.

KUMAUN DIVISION.—In the Kumaun district proprietors and tenants of both classes frequently make irrigation channels from streams and rivulets at their own expense. Persons to be benefited often give large sums and also their own labour for the purpose. In Garhwál a similar practice prevails among occupancy tenants, but their action is affected by their poverty. In the Taráí district, where Government owns the proprietary right in most of the area, large sums are spent, such as advances for seed and cattle. The Superintendent makes no mention of expenditure for material improvements. The few proprietary zemindars do nothing whatever to improve.

JHÁNSI DIVISION.—In Jhánsi and Jalaun the zemindars are impoverished and apathetic as regards improvements, and Marváris who are replacing them do not care to invest money in that way. In Jhánsi hereditary cultivators are also poor, but are more ready to improve the tract by making “*bundhyas*” in black soil and digging wells, though as regards the latter they are hampered by traditional custom. In Jalaun all the above tenure-holders dig wells when they can get advances, spending from their own purses a sum equal to the advance.

LUCKNOW DIVISION.—But little appears to be done here, either by tenants or cultivators, in the way of material improvements. In Bara Banki, what little is done is limited to masonry wells. In Unao, some few landlords—but very few—do make wells; no tenant may make a lasting well without permission from his landlord; and in Lucknow the Deputy Commissioner writes that talukdars from apathy, and under proprietors and tenants from poverty, do not carry out material improvements.

RAI BARELI DIVISION.—Wells and drains are made to a greater extent in Rai Bareli than in other districts, owing perhaps to greater pressure of population; they are made mostly by the representatives of village co-sharers and seldom by tenants. Over 100 wells were made in 1870 at an average cost slightly under Rs. 200 each. Mr. Blennerhassett considers that security of tenure and possession of means are both necessary or wells to be largely made.

Colonel Perkins, Deputy Commissioner of Partabgarh, shares in this opinion, and states that wells in his district are occasionally constructed by proprietors and well-to-do tenants of all classes, but most commonly by cultivators of the industrious classes, who, though they have no legal security of tenure, enjoy from their small numbers and great rent-paying power a considerable measure of fixity.

FYZABAD DIVISION.—In Bahraich irrigation is rarely resorted to, owing to moisture of the soil and sparse population; and in the adjoining district of Gonda improvements are more extensively made by ordinary lessees and tenants-at-will than by proprietors and sub-proprietors. Apathy and indifference on the part of the talukdar, and poverty on that of the sub-proprietors, are generally the causes assigned.

BENARES DIVISION.—In *Gházipur*—a permanently settled district—both proprietors and cultivators are said to carry out improvements in the way of digging wells.

In *Mirzapur*, with the exception of the Court of Wards' estates and the Mahárája of Benares, non-cultivating proprietors do not carry out improvements. Cultivating proprietors in the ultramontane tracts, and occupancy tenants throughout the district, habitually endeavour, as far as their means will permit, to improve their holdings by the construction of wells, embankments, and tanks. The Collector states that he has found, as a matter of experience, that, without security of tenure, cultivators will not make improvements.

In Benares the consent of the zemindar is held to be necessary for digging wells by all tenants except tenants at fixed rates. Resident zemindars give such

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PUNJAB.

Mr.

J. B. Lyall.

NORTH-
WESTERN
PROVINCES
AND OUDH.

Mr. Quinton.

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consent readily, but non-resident zemindars of the baniya class do not easily consent to the construction of a well without a *quid pro quo*.

In Gorakhpur the number of tanks or other irrigation works completed annually from private capital is said to be small. "The Gorakhpur zemindar is not much of an improver."

MEERUT DIVISION.—The Collector of Muzaffarnagar writes that, as a rule, neither proprietors nor cultivators are very ready to spend money upon wells or other improvements, while the Collector of Meerut states that proprietors who are tolerably free from debt, and have a property of fair size, are always ready to make wells. Long and expensive channels for irrigation are very seldom attempted by proprietors from their own resources.

Petty co-parcenary proprietors in Meerut have no incentive to make improvements, and occupancy tenants are never allowed to dig a pukka well through the desire of the zemindars to drive them into difficulties and force them to abandon their tenures.

AGRA DIVISION.—In *Muttra and Farukhabad* proprietors and tenants are said to dig wells and irrigation channels, and similar improvements are made in Etawah by tenants with rights of occupancy, who form a large per-centage of the tenants throughout that district.

ROHILKHAND DIVISION. *Budaun*.—In most of the villages, except the bhūr tract, tenants, with the consent of the landlords, are in the habit of digging kucha wells, the average depth of water from the surface being 20 feet, and the cost of digging such a well being Rs. 6. When water is deeper masonry wells are rarely made, owing partly to poverty of proprietors and partly to objection of tenants to pay enhanced rent, whether they use the water or not.

In *Moradabad*, Mr. Alexander, the settlement officer, writes that, as a general rule, neither the proprietors nor the tenants carry out material improvements, except the digging of pukka wells for the sugarcane field, which is done by the tenants. In *Bijnor* the same state of things exists. Mr. A. Colvin writes: "The habits of generations discourage enterprise; so does the coparcenary tenure and the prevailing absence of capital. Kucha wells can be so easily dug that the want of others is not felt."

ALLAHABAD DIVISION.—Cawnpore landlords and tenants do not care to waste capital in improvements unless driven to do so. Irrigation channels are constantly dug under the Northern Indian Canal Act, and the delay of the Irrigation Department in deciding how far canals are to be extended or modified discourages the construction of wells.

Banda.—In the Karwi subdivision Mr. Rose writes that improvements are seldom carried out by any class of tenants. Black soil and water 80 to 100 feet from the surface prohibit the construction of wells. The only mode in which improvements are carried out is by embankments, and the localities are limited in which these can be made. They are as a rule constructed by cultivating landlords or tenants with a right of occupancy.

District officers are unanimous that security of tenure and wealth, or, at least, easy circumstances are equally indispensable conditions for effecting material improvements. The Collectors of Cawnpore and Meerut give further special reasons, above stated, why wells are not more extensively dug in their districts; and Mr. H. Harington, Deputy Commissioner of Unao, suspects the greatest check to improvements to be the feeling that at the termination or the existing settlement the benefit of these would be shared with Government. Other officers, however, consider such a feeling to have no practical effect in deterring landlords from making improvements. Mr. H. Harington adds: "At present agriculture is a means of life rather than a profitable investment of capital. The intelligence of commerce has not yet permeated to

the depths of the bucolic mind." Mr. Watts of Farukhabad suggests as another reason which hinders such investments of labour and capital the proverbial apathy and ignorance, and the crass conservatism opposed to all innovation, of the agricultural class; and Mr. Alexander, in para. 31 of the answers from Moradabad, enumerates several other causes arising from the peculiar character of the population of that district.

As to the second branch of the question, district officers are also unanimous that the Land Improvement Acts have had little or no effect. No reply has been given to the question as to whether they have tended to enlarge or narrow the making of advances by Government. Most agree that the operation of the Acts should be facilitated, and point out difficulties for removal.

The difficulties which at present hinder the working of the Acts are—(1) the minuteness and expense of the initial procedure before an application can be acceded to. For instance, the delay and vexation of the preliminary local inquiry, the execution and registration of a bond, the cost of the stamp, and the worry of dancing attendance at courts and offices till these operations have been completed, when the mahajan is ready to advance money, doubtless at higher interest, which does not much concern the borrower, without any of these inquisitive formalities.

(2.) *The demand for security*.—This is a great obstacle. Persons with good credit have no difficulty in getting money from the village banker without trouble; so that the only customers left for Government are those whose credit is shaken, who have difficulty in giving security, and without security Government will not lend.

(3.) *The rigidity of the rules for repayment by instalments on fixed dates*.—The mahajan will allow the amount to run on and take sums on account when the debtor can give them; but no such leniency can be shown by the tahsildar, whose efficiency is estimated by his success in punctually realising the Government demand. It not unfrequently happens that a well has failed from some imperfection in the site or defect in construction, and for such cause no allowances are made.

(4.) Another cause assigned is that in coparcenary communities, shareholders cannot agree as to the proportion in which the water is to be divided.

On the question of the demand for interest being obstructive opinions are divided. The majority of officers hold that it has no obstructive effect. The Collector of Benares (Mr. Church) is of a contrary opinion. Mr. Sandys, of Budaun, would reduce the rate to 4 per cent.

The officiating collector of Meerut states that obstacles are too readily thrown in the way of applications by the native officials, from whom, in case of advances, incessant watchfulness is required to prevent the money being applied to other purposes. He thinks that a per-centage granted to the tahsildar might have a beneficial effect, and the settlement officer of Moradabad is of opinion that a successful working of the Act cannot be looked for until a special officer is deputed to superintend it, travelling about the districts the greater part of the year and finding out the persons who are fit to receive advances, and making generally known the terms on which they will be granted.

The Deputy Commissioner of Jalaun recommends that the scope of the Act should be enlarged by granting advances for the purchase of seed and plough bullocks; and Major de Montmorency (Bahraich) believes that "by the systematic apportionment of a district into groups of villages, by restricting advances for the construction of wells within each such group until its requirements were satisfied, and by employing at the rateable charge of the borrowers a few skilled well men to superintend the most difficult part of the operation of well sinking, something

"more effectual would result than from the existing desultory system of granting takavi to scattered parts of the district where the revenue officials cannot maintain a continuous and effective supervision."

The Collector of Bareilly would make advances to landlords without interest for the purpose of sinking masonry wells, merely as a slight safeguard against drought, but considers it useless to attempt to induce tenants to sink capital in improvements, as the greater part of the profits will infallibly be taken by money-

lenders. The rainfall in his district is generally so ample that he doubts if it would pay to increase irrigation to any great extent.

Mr. Rose, from Karwi, is of opinion that the Act should allow advances to tenants as well as to landlords, and that thereby more land out of cultivation would be brought under the plough. The rate of interest should be lowered and the procedure simplified. Mr. J. Simson notes that the latter is a specially important point, and that the present rules are far too cumbrous and detailed.

6. The Board consider (as they have always held) that the demand of a high rate of interest is the greatest deterrent to borrowers. They would make interest payable only on instalments which are in arrears, reducing the 12 per cent. of the Board's Circular IV. of 1841 (para. 29) to 6 per cent.

7. Perhaps an equally powerful deterrent is the provision in section 15, Act XXVI., 1871, to the effect that an arrear of takavi shall be recoverable as if it were an arrear of revenue due on the land. Two or three bad seasons following the year in which takavi repayments commence may make it impossible for the zamindar to pay up his instalment. He is told, if he fails to pay punctually, he may lose his land altogether.

8. The Board do not think it would be fair to attribute the "non-efficiency of the recent Act" either to want of activity on the part of Collectors or of their subordinates in urging such loans and informing the people thereof. The Collector, while he "urges such loans," must in common honesty inform the people that they will have to pay 6½ per cent. interest on the amount advanced, and that if they do not pay their

instalment, their land may be sold for recovery of the arrear. The Senior Member has been met, when urging zamindars to take advances, by the objection that they have to pay interest, and they had rather get the money at much higher interest from their mahajan than run the risk of being treated as land-revenue defaulters.

9. Nor does it seem fair to attribute the failure of the Act to the opposition of tahsildars when the reasons for its failure are shown to be contained in the Act itself.

10. The indebtedness of the people is not a new cause of hindrance, and is of course a great bar to any improvement to be effected by the people, either directly at their own cost or by loans from Government or others. This is one of the main arguments in favour of a compulsory system.

11. The records of their office do not enable the Board to get any satisfactory statement of takavi advances to show the decrease due to the Act and rules thereunder. A statement is, however, enclosed which will show the sums advanced from 1857–58 to the end of the revenue year 1877–78.

STATEMENT showing the Yearly Amount advanced as Takavi in the North-West Provinces from 1857–58 to 1877–78 inclusive.

	Meerut.	Kumaon.	Rohilkund.	Agra.	Jhansi.	Allahabad.	Benares.	Total.
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
1857–58	—	—	—	—	—	—	—	—
1858–59	16,000	—	350	—	—	1,990	—	18,340
1859–60	1,813	—	2,400	350	—	7,100	—	11,663
1860–61	7,795	—	1,963	5,896	—	12,691	—	38,285
1861–62	68,203	—	2,995	20,218	—	6,889	—	98,285
1862–63	24,393	—	855	18,210	200	2,063	—	45,721
1863–64	4,300	—	1,350	8,195	1,310	1,287	—	16,442
1864–65	5,825	—	1,110	17,927	13,537	—	—	38,399
1865–66	1,588	—	580	17,080	10,940	40,732	—	70,920
1866–67	14,100	—	117	6,650	4,727	7,350	—	33,944
1867–68	2,375	10,000	600	6,100	6,654	1,300	—	17,029
1868–69	21,254	—	8,399	3,075	84,744	7,081	2,136	136,689
1869–70	39,544	—	53,521	52,547	1,35,095	85,372	6,535	422,614
1st April 1870 to 30th September 1870.	400	—	850	250	87,210	77,915	—	166,625
1870–71	1,627	—	600	1,899	1,100	52,793	—	58,019
1871–72	7,538	—	—	1,949	450	300	—	10,237
1872–73	22,470	—	—	1,050	19,876	1,150	—	44,546
1873–74	10,927	—	1,200	581	11,034	5,907	10,234	39,883
1874–75:								
Under Land Improvement Act.	7,172	—	120	2,250	1,526	5,615	—	16,683
Outside Land Improvement Act.	—	—	5,000	—	8,992	3,439	—	17,431
1875–76:								
Under the Act.	1,775	—	800	2,800	1,707	2,704	—	9,786
Outside the Act.	2,838	—	—	5,000	11,622	20,068	1,455	40,983
1876–77:								
Under the Act.	1,775	—	500	1,085	2,318	3,115	—	8,793
Outside the Act.	39	—	—	642	12,955	16,961	399	30,996
1877–78:								
Under the Act.	12,975	—	3,540	15,925	10,571	23,757	1,775	68,543
Outside the Act.	2,031	—	81,313	142,559	31,445	12,233	29,153	298,734

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WESTERN
PROVINCES
AND OUDH.

Mr. Quinton.

The Board of
Revenue.

CHAP. I. QN. 11.

BENGAL.

Mr. Toynbee.

Holders of tenures in Bengal of the nature of those described in the previous paragraph have never been in the habit of carrying out improvements in the lands they hold. Their sole idea of any advance in this direction is the extension of cultivation to lands not hitherto cultivated, not the improvement of those already under cultivation. The former procedure is in accordance with their rigid and inflexible law of custom, the latter is not. The increasing pressure of the population on the soil works in the same direction. They are content to live and to cultivate as their ancestors did before them. The bulk of the cultivation in Bengal is that of rice-lands, and it is exceedingly difficult to say how, in the great low-lying, rice-bearing tracts, any such material improvement, such as is indicated in question 11, would be feasible. In most years the rains of heaven suffice for all the wants of the cultivators. Tanks and wells would only run dry in dry seasons. Even where they exist, they are never used for rice irrigation. In the purely rice-growing tracts of Bengal, therefore, improvements could only be effected in the shape of large projects of insurance by means of irrigation, which, even if feasible from an engineering, would certainly be impossible from a financial, point of view. In Behar and in parts of Chota Nagpore, where *bhadoi* and *rabi* crops are grown, the improvements indicated in question 11 are, to some extent, carried out. In the Sonthal Pergunnahs and other hilly tracts, small streams are banded up, and water is thus collected for the rice grown on lower-lying lands. In south Behar there is a system of collecting surplus rain and river water into reservoirs and using it when the rains fail. For dry cultivation, wells are dug when the nature of the soil permits. But whatever is done is done according to the custom of the country handed down from time immemorial. No new line is struck out. All the improvements mentioned above are on a small scale and generally limited to one village or one estate. There is no power of combination among either landlords or tenants either of the same or of different estates to work together for the common good. There is no energy or enterprise to act as an incentive to improvement; every cultivator is content to live as his fathers lived before him. Landlords and middlemen are merely rent-collectors; they take no interest in their estates or tenures. If any improvements were feasible, it would be necessary to look to the actual cultivator for them. Insecurity of tenure and fear of enhancement of rent act as a bar to the digging of wells, the only improvement within the means of the individual cultivator. But on the other hand it

BENGAL.

cannot be said that those whose tenures are protected by law are much more ready to improve their lands than others. Wealth and poverty hardly affect the question. Those who have wealth prefer to spend it on social and religious ceremonies. Those who have not, have no care beyond the daily provision of food for themselves and their families. Both classes move helplessly in the groove of custom; that custom is to take as much as possible out of the land and to give nothing back to it. It is possible that as the pressure of the population on the soil increases, and as the margin of cultivation advances, necessity will hereafter compel the people to adopt an improved system of agriculture, assuming for the sake of argument that the present system is not the best that the circumstances of the country render possible. Nothing but necessity can overcome their present indifference, and if in times of distress the people are to come on the hands of the State this indifference will tend rather to increase than to diminish.

The Land Improvement Act has been practically a dead-letter in these Provinces. In the year 1876-77 only Rs. 975 were advanced, and in 1877-78 only Rs. 459 in the whole of Bengal. In the famine of 1874 large advances were made under the Act, but neither its letter nor its spirit were complied with, and the money was devoted to purposes quite foreign to the improvement of the land, unless the saving of the lives of those who cultivate it can be so called. The advances are not wanted, or they would be taken. The procedure is somewhat elaborate, but, on the other hand, if it were not so, there would be the fear of advances not being applied to the objects for which they were ostensibly granted. The rate of interest charged by Government is far lower than that paid on loans from mahajans and others, and cannot in any way be said to be prohibitory. But there is this difference in the favour of borrowing from the latter, that he is not inflexible in his demand for punctual repayment in strict accordance with the agreement, and will, if necessary, accept payment in kind. The Government has all the machinery of the law at its back to enable it to recover the sum advanced; the costliness of the law for the private lender makes him prefer the customary mode of renewing the loan on payment of a consideration. Generally it may be said that the Land Improvement Act is not required for these Provinces, because the people have not the slightest desire to avail themselves of it, and because if they had, the objects on which the money could be expended so as to yield a fair return are either no known or do not exist.

CENTRAL PROVINCES.

CENTRAL PROVINCES.

Mr. Nicholls.

The opinions of far more experienced and able officers of the Commission are happily available in discussing these questions, but I trust the deep interest I feel in the subject will be held to excuse my offering my views on them.

We have no canals from whence to draw water. Channels from rivers are, I may say, unknown.

Tanks are constructed just as often by non-agriculturalists, men of wealth, for "dharma," as by agriculturalists. Tanks would generally be beyond the means of ryots or villagers other than malguzars. Wells also are constructed without regard to agricultural prospects. Open fields would hardly be converted into embanked fields by others than those possessed of proprietary or occupancy rights or tenants-at-will holding long leases, with fair prospects of not being harassed, by reason of their possessing more valuable fields, into relinquishing their holdings.

Waste lands, again, are almost always brought into cultivation under "pagras" leases or special agreements. Permanency of high rates for produce and

pressure of population will determine the advance of the area of regular cultivation.

Question.—Are their actions in this respect affected most by the security or insecurity of their tenure or by their wealth or poverty?

The poor man, whatever tenure he may enjoy, cannot lay out the necessary capital. The wealthy man with a secure tenure is more likely to effect a permanent improvement by making a tank or sinking a well or embanking his fields; as he probably knows the value of wealth, he prefers an immediately reproductive outlay and benefit for his fields.

The wealthy man with an insecure title who wishes to perform an act of merit in his village is, I think, more likely to plant a tree, or clump of trees, or a grove.

Are there any other reasons which hinder such investments of their labour and capital?

For an answer to this question we must look to the past political and fiscal history of our country. The effects of the ravages of the Pindharis have lasted longer on the minds of the people than on the face of

the earth, and the oppressions of the later days of the Marhatta power, I think, still check to an appreciable extent the employment of capital, and tend to make it against the "custom of the country" to lay out money merely for the sake of improvements. To have done such a thing, not so very many years ago, would have been almost suicidal. The history of the Nerbudda valley shows this clearly.

I think that the custom and desire to keep wealth in a form in which it could be removed or hidden, and the great disinclination to tell even what had been the produce of their fields was rendered almost hereditary among the people by the wretchedness of those times, and to the present day they have not acquired sufficient confidence in the stability and long enough experience of the high principles of Government to counterbalance all these traditional and habitual restraining influences and induce them freely to lay out their own capital to any considerable extent in permanent improvements to the land, at least, on works of more permanence than field embankments. In this, I limit myself to cases where religious feelings have no share in influencing the cultivator's employment of his surplus cash.

To this inherent dislike to spend money openly and to lock up capital in unconvertible masonry or earthwork there are other considerations to be added. The great majority of the people have not the means, or, if they have the means, are too apathetic to take steps for increasing the yield of their fields, or like Mr. Elliott's true *kirsan* of Hoshangabad only look with pride to broad acres, and think permanent improvements and manuring and irrigation as little peddling matters. The expanse of our lands compared with the paucity of cultivators, coupled with low prices from want of outlets for our superfluous produce hitherto have not necessitated their looking out for new and expensive means for increasing the produce of their fields. A man with a surplus of cash will look out for more land, or will buy more cattle, rather than lock up his capital in permanent works.

In Chhattisgarh, in addition to all these deterrent influences, is to be superadded the insecurity for investments in land, where the custom of shifting tenures exists or might be revived. On the whole, I am inclined to think that it will take a long time before these causes cease to have effect, before the agricultural classes will lay out much capital on petty irrigation works, actuated thereto solely by a desire to increase the yield of their lands. Individual cases of more enterprising and more industrious men, especially of the Mali, Kachi, Ponwar, Bhori, and Kori (of Bhandara) castes will no doubt come to notice, and so will those in which tenants-at-will, having confidence in the generosity of their landlords, invest their savings in the irrigation of their fields.

But at present the incentives of permanent high rates with brisk markets for produce, and pressure of population, have not come into general operation.

Effect of recent Land Improvement Acts :—

I show the figures for many years past.		
1865-66	-	26,530
1866-67	-	34,675
1867-68	-	21,550
1868-69	-	77,380
1869-70	-	146,213
1870-71	-	14,375
1871-72	-	6,775
Famine years.		
1872-73	-	-
1873-74	-	21,875
1874-75	-	-
1875-76	-	3,120
1876-77	-	2,940
1877-78	-	7,515

The law came into operation in 1871-72, Act XXVI. of 1871.

It would thus appear that the sums now advanced for the permanent improvement of lands have dwindled very greatly, and in the past year nearly all of the advances were made in Chanda, Saugor, and Balaghat.

When we had no intricate formalities to go through, no delays in giving out advances, and not so much trouble with stamps and registration, and especially when we had no summary method of realising arrears, we made no bad debts, and the intentions of Government were more adequately responded to. But the fact is that Government is thought to be a hard creditor, and in addition to the perhaps needless worry at Cutcherry before the money is advanced, and the minute inquiries in his village, the borrower is haunted by the anticipation that if he should not pay up on the exact day fixed, or the next day, he is liable practically to arrest in the most public and obnoxious way. A money lender on the other hand would give time, or at the worst would have to proceed by regular suit in the civil court, and this is the chief reason why the people are now positively reluctant to apply for loans from Government, except when they find the Deputy Commissioner for the time being is especially interested in this matter. The over ingenuity of the Act and the first set of rules strangled it. I think all that is necessary is a simple application coming from a cultivator or proprietor of good character, an assurance that the village proprietors and people have no objection, and reasonable security, such as the sanctioning authority might be satisfied with. In the ordinary course of events it would be found out if the loan had been misapplied. Should this be the case the refund should be required after two or three months' notice, and arrest or *quasi* arrest should not be resorted to. For the security bond, which should be made as simple as possible, I think the Government of India might specially exempt such deed from stamp duty and registration, and that Deputy Commissioners, subject to the rendition of proper reports, so long as the security continued satisfactory, should have a large discretion in allowing a period of grace or deferring the payment of an instalment, and that neither the person or property of the debtor should be touched till after the surety had received notice of not less than a month to arrange matters with the Deputy Commissioner, or if more convenient, at the Tahsili.

I think this would make such loans as popular as they now are unpopular.

It is to provide for times of famine that many cultivators and Malguzars, perfectly solvent, like to keep their names on the debtor's side in the books of Mahajans who are known to hold stocks. I am inclined to think that a distinction might be well made in cases where we lend money to purchase seed, grain, and cattle in famine and in panic times. We have always required very prompt payment. Where there are prior liabilities and existing liens this must be insisted on, but, when the time of payment comes, famine and panic having passed away, and mutual trust and interests having again re-established the debtor's credit, then if the debtor can give good security, I see no reason why the debt should not be made repayable over some two or more years.

I think the scope of the Act is wide enough, but that the rules are troublesome and impede its utility.

I think as a provision against famine and as a material improvement to the country at large, it is highly desirable that the operation of these Acts should be facilitated.—*First*, there would be the direct return from the capital thus laid out. *Secondly*, the example of Government proving its confidence in its own stability and progress and in the wisdom of such undertakings would bring private capital into the same field. *Thirdly*, there would result a general tendency to a lowering of the traditional and customary rates of interest charged to agriculturalists.

The foregoing answers indicate my opinion that the law does not check the permanent improvement of the land nor expectations of future enhancement of the revenue assessment. There may be, and probably is, some slight check more in individual cases than as a general condition of the country, owing to apprehensions of indirect pressure and of enhancement of rents, but the determining cause is the ability or inability to command and apply capital.

CHAP. I. QN. 11.

CENTRAL PROVINCES.

Mr. Nicholls.

CHAP. I. QN. 11.

CENTRAL
PROVINCES.

Mr. Nicholls.

The digging of a well and the planting of a tree rank only as meritorious actions, after the begetting of a son, with a view to future life. It follows that many wells are dug without regard to the improvement of the adjacent lands and of rent and the incidents of tenures.

For purely agricultural wells uncertainty of tenure may act as a check.

The Saharanpur settlement rules regarding the digging of wells are embodied in the Wajib-ul-arz, or village administration paper.

For example, in the Hoshangabad district, the clause runs thus:—

Rights to wells, "All vested rights in wells now existing shall be maintained and preserved. If any person now owning a well shall give up his land or shall be ousted in default of payment of rent, or shall die without heirs, the wells shall become the property of us, the Zamindars. In future any cultivator may without our permission dig wells in his own land, but he shall have no interest in the wells as soon as he loses his interest in the land in which it is dug. Since no irrigation is now carried out, we will advise and persuade the cultivators to adopt the system of irrigating their fields."

When a landholder elects to purchase, under his right of pre-emption, the holding of an absolute occupancy ryot by giving him the equivalent of five years' rental, the ryot is entitled also to receive full value without interest of all permanent improvements effected solely by the ryot subsequent to the fixation of rent.

The occupancy ryot is protected against enhancement of rent on account of his lands having been permanently improved by him, under the provisions of Act X. of 1859.

If he or the absolute occupancy ryot suffers himself to be ousted for arrears of rent, he gets no compensation. In Nimar and Chanda the recorded absolute occupancy tenant cannot transfer or mortgage, but has a right to receive a compensation for improvements, when ejected, and may transfer to any person so much of his holding as may be affected by or cannot be properly separated from land affected by such improvements, together with his right to compensation on ejection. The person to whom land may be

transferred under this rule will hold as a tenant-at-will, unless the tenant from whom he received such land held under an unexpired lease which he could transfer, or possessed a transferable right of occupancy, and shall have transferred the lease or occupancy right also.

An absolute occupancy ryot can also transfer to a co-sharer by inheritance, or to a person who at the tenant's death would inherit the land.

In Chhattisgarh much good has been effected within the last 14 years by grants by Government of rent-free plots to persons who construct roadside and village drinking wells or establish roadside groves of specified dimensions. But these measures have been adopted for the convenience of travellers, and on sanitary, not agricultural grounds.

As for anticipations of increase of the revenue demands, in the first place, our settlements as yet have a long term to run; secondly, the people have faith in the moderation of Government. Therefore I think that there is no limiting of the execution of permanent improvements on this score.

As for increase of rent, Malguzars for their *sir* lands, and proprietors of holdings (Malik Makbuzas) and Maafidars, and generally service holders, pay none; absolute occupancy ryots are not liable to increase of rent for the term of settlement; conditional occupancy tenants are, I think, in this respect, fairly protected by law. Only in case of a repetition of the story of Naboth's vineyard are they in danger. Improvements to their lands might tend to increase their danger of losing their rights, not by legal process, but by indirect ways. The Malguzar, if powerful, can make it very uncomfortable for any villager, to retain what he considers adverse rights, and practically, the only things to support the ryot exposed to indirect pressure are such public opinion as exists, the discountenance of Government officials, and the support of a money lender. Reckoning on his own solvency, on a long lease, or such supports, and the personal character of the Malguzar, of the Malguzar's family, or of some of the co-sharers in the malguzari, a tenant-at-will may exceptionally undertake a work of permanent improvement, but generally he will be influenced by other considerations than hopes of enjoying adequate returns for his outlay.

a sum of money borrowed for a well being spent on a marriage. In order to prevent funds intended to aid improvements from being used to foster waste, the Government is obliged to hedge round its advances with checks and precautions; and as the machinery by which effect is given to the necessary formalities, is over-taxed and sometimes over-centralised, a Government loan is attended by so much delay at first, and so many restrictions subsequently, as to make it little desired. In this, as in other "non-regulation" Provinces, the principle of administration is to combine executive and judicial functions in the same official; and probably no one who understands the condition of the country and of the people, will dispute the advantages of the existing system. But as time has gone on, the work of the courts has enormously increased, and many of those entrusted with the administrative management of the country, are little better than slaves to the Bench. The Administration is doing what it can by savings and re-arrangement to relieve the pressure where it is greatest; but we shall very soon have reached the limits of economical re-adjustment; and must either increase our establishments or content ourselves with a rougher and simpler standard of work.

In the case now under discussion the alternative would, I think, be between entrusting the distribution of agricultural loans to a special agency, or making up our minds to submit to occasional loss and malversation. So long as advances are only available through Tahsildars, who, however much we may try to relieve them, will always be very fully occupied,

and who, living far as they do from any supervising authority, often conduct public business loosely and irregularly, it is impossible to hope that the local inquiries necessary to satisfy the Government of the good faith and solvency of the applicant will be promptly and smoothly made, and that there may not be instances of unreasoning pressure in exacting repayment. Both the preliminary inquiry, and the subsequent dealings with the borrower, require time and judgment, which an already overworked Tahsildar is often not in a position to give. Possibly the duty of superintending agricultural advances might be undertaken by the special officers, whom there has been a question of appointing in this Province (and who have, I believe, been appointed in Oudh), for the management of estates belonging to minors or embarrassed landholders, and for the time being under the charge of the Collector. One great difficulty in creating these appointments has hitherto been that the cost of maintaining them would diminish the chance of redeeming encumbrances on estates taken over simply to free them from debt. But if part of these charges were debited to management of an agricultural advance fund, both objects, viz., the free diffusion of agricultural loans and the efficient management, at a comparatively low rate, of encumbered estates, would be to some extent attained.

The only other alternative would be to provide that officers of all grades, down to that of Tahsildar, should keep the subject of agricultural loans prominently in view on their periodical tours, and should be supplied with funds, and otherwise empowered to make imme-

diat advances to approved applicants. Any such system would be open to many obvious risks, as, for instance, that there would be a diversity of practice, and that loans would be therefore irregularly distributed, that they would not be available throughout the year, but only when chance or the exigencies of the service brought an official in the direction of the applicant's village, and that, if loans are to be more easily made than at present, unpractised officials might sometimes be taken in. But I think the last of these dangers would be also the least. There is probably still enough respect in the country districts for the central power to prevent general or even frequent attempts to impose on an officer of Government, brought face to face with the applicant. Under such circumstances it is probable that loans would rarely be taken without a more or less unreserved intention to apply the whole or part of them to their ostensible purposes; and in most cases there would probably be little subsequent deviation from original intentions. There would perhaps be more danger of repayments falling into arrear, or even altogether failing, if present safeguards were relaxed, though they might be partly replaced by increased personal supervision both in granting and in recovering loans. But this again implies heavier calls on the time of the supervising officials, and leads back to the conclusion that a system of Government advances to agriculturists can never be successful or popular until it is worked by separate officials, having time enough to dispense with paper checks, and to treat directly with borrowers.

BERAR.

Lieut.-Col. Menzies.—Amraoti.—"Those who hold garden lands improve their holding. In addition to clearing out old wells, I estimate that from 75 to 100 new wells are annually sunk."

Major Mackenzie.—Ellichpur.—"Very few holders of land carry out improvements, such as digging wells, &c., it being asserted that on a revision of assessments such improvements would be overlooked, and the ryots charged with the higher or garden rates."

Major Szczepanski.—Wun.—"Hitherto it has only been rarely that holders of land have attempted to improve their land by digging wells and channels, but since the introduction of the new rules prescribed by the Resident under the provisions of the Land Improvement Act, there is more inclination to do so."

It is well known that a great many new wells have been made in the Akola District during the last ten years, but statistics on this point are not available.

In the Jalgaon Taluka, at the time of the settlement in 1865, there were 1,860 wells in excellent order. The area of the taluka is 419 square miles, which gives an average of more than four wells to every square mile.

It would appear from Major Mackenzie's reply that the conditions of the settlement are not properly understood in the Ellichpur District. Rule I. of the settlement rules, which refers to the point in question, runs thus:—

"With a view to the improvement of the country and people, the assessment now introduced by the Superintendent, Revenue Survey, has been fixed by Government for a period of 30 years, during which period the full benefit of every improvement, such as the conversion of dry into irrigated land, by the digging or repairing of wells or tanks, the planting of fruit trees, &c., will be secured to the incumbent of the land, and no extra assessment levied on that account. A revised assessment may be made at any time after the expiry of the present settlement. Such revised assessment shall be fixed, not with reference to improvements made by the owners or occupants from private capital and resources during the currency of any settlement, but with reference to general considerations

of the value of land whether as to soil or climate, prices of produce or facilities of communication."

The words in italics show that due provision has been made to secure hereafter to landholders the benefits of all improvements effected by the expenditure of their private capital, and my own experience in the Akola and Amraoti districts is, that these conditions are generally understood by the people.

I agree with Major Mackenzie in holding that one great reason why more improvements are not made is that cotton and jowari do not require irrigation. There is no inducement to landholders generally to convert their cotton fields into garden-lands. Garden produce requires much labour and attention, and the demand for it is limited; while, on the other hand, cotton is easily cultivated, and can be sold in the established markets on any day and to any extent.

In his report on the Mekhar district, Major Elphinstone mentions the following reason against irrigation in that district from the Penganga river:—

"The natives look upon this (the Penganga) as a holy river, and venerate it almost as much as they do its namesake the 'holy Ganges,' in Bengal. The idea of damming it up, or creating any works that could in any way interfere with its flow, seemed to them almost sacrilegious. There are many spots at which a small dam could be advantageously created, and but for some religious prejudices on the part of the natives, it would be difficult to account for their not having done so themselves. The expense would have been but trifling. At the town of Mekhar a dam could be easily thrown across this river, and a good deal of land brought under cultivation. Even at the end of January there was a good flow of water in the river."

Lieut.-Colonel Menzies.—Amraoti.—"Taccavi advances are rarely asked for, and the formalities to be gone through before they are obtained rather discourage applications for them. They are chiefly needed to improve the water supply, and the villagers prefer carrying out works badly, at a great waste of money, to permitting the employment of professional engineers. Schemes for works get so bandied about, that much time is lost and interest in them cools down,

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Mr. Dunlop.

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budget allotments lapse, and files of correspondence accumulate, while no results follow."

Major Szczepanski.—*Wun.*—"The people are deterred from availing themselves of advances under the Land Improvement Act; 1st, by the difficulty, owing to their impoverished condition, of furnishing securities; 2nd, by the intricate, tedious, and unintelligible procedure which has to be gone through before the advance can be obtained; 3rd, being indebted to and in the power of the sowcars, they are not allowed to become debtors elsewhere."

Major Mackenzie.—*Ellichpur.*—"The object of the Act has been widely made known to the people, but the applications have been almost nil."

BOMBAY.
Mr. J. B. Peile.

The following is a summary of the opinions of the officers consulted:—

Kaira.—The holders in question dig wells, but attempt no other works. They believe in the security of their tenure, but are prevented from doing more by want of means. They have not sufficient energy or education to avail themselves of the advantages of the Land Improvement Acts. The demand for interest on Government advances is not obstructive or prohibitory.

Thana.—No special improvements under any tenure. Action is not impeded by insecurity of tenure. Some men of capital have lately invested in reclaiming lands from the salt marshes. The Land Improvement Acts have not been taken advantage of. Tuccavi advances of small sums without interest are allowed only to certain wild tribes, but should be extended, as the cultivators are driven to the Saucar for small loans. The Land Improvement Acts are suitable for men of position, but the ordinary cultivator wants a small advance at nominal interest without trouble.

Khandesh.—Holders who are well-off or energetic do improve their lands. Poverty rather than insecurity of tenure prevents cultivators from sinking wells and other improvements. The number of applications for loans under the Land Improvement Act is increasing. The conditions of the Act are not too stringent if the borrower is solvent and hard working. The interest is a little obstructive and might be reduced from 6½ to 5 per cent.

Nassick.—The holders are alive to the benefits of irrigation, and dig wells yearly and feed irrigation channels by dams built by themselves. Their efforts are limited by poverty, not by the tenure, which is secure in all cases. The Land Improvement Acts have not been much used, owing to the number of formalities and difficulty about security. The interest is low compared to that charged by money-lenders, but the ryot dislikes the punctual repayment enforced.

Sholapur.—Wells are dug and fields banked and levelled. The tenure would be considered quite

Col. W. C. Anderson.

The holders of all lands in the Bombay Presidency are in the habit of digging wells for irrigation in all localities where it is practicable. Every day sees the digging of new wells going on. The tenure of land afforded by Bombay Act I. of 1865 affords the fullest security from additional taxation for all improvements on his own land effected at the ryot's own

Mr. W. G. Pedder.

Details regarding the working of the Land Improvement Act will, doubtless, be supplied by the Collectors. Speaking generally, I believe that Government advances are taken advantage of to a very small extent to effect improvements, and this certainly not on account of the rate of interest charged, which, compared with that commonly paid for similar loans to saucars, is almost nominal. It is very difficult to say why the people do not more largely avail themselves of the facilities Government offer for making perma-

Before the introduction of the Land Improvement Act we never gave any advances to the people, so that the Act has not in any way tended to narrow such transactions.

Another reason why Government advances are not more generally applied for is, I think, that agriculturists dislike, and are afraid of, the fixity of our rules for repayment by instalments. Instalments must be repaid on the specified dates, any failure to do so rendering the defaulter liable to be sold up. But in dealing with the Marwadi money-lender the agriculturist knows that a little more interest, a fresh bond, or a small payment to account, will enable him to tide over his difficulty for a time.

BOMBAY.

secure if there were a recognised limit to the increase of rent at the end of the settlements. Advances under the Land Improvement Act are increasing. The interest is not too high.

Kaladgi.—Holders of all kinds dig wells, make channels, and embank fields as their means permit. No holders are deterred by insecurity of tenure. The Land Improvement Act is seldom taken advantage of. The interest is not prohibitive, being below the current rate.

Canara.—The mulgars do little in the way of improvements, and their tenants no more. The Land Improvement Acts are not used. The interest is less than the current rate, but the punctual repayment deters, and the Saucar, who will wait, is preferred.

Satara.—Wells are dug and the people seem alive to their utility. There are very few canals. Where they exist, the people use their water freely. Where wells and channels are not dug, the cause is poverty rather than the insecurity of tenure, which is secure enough. The machinery of the Land Improvement Act is too intricate to be popular. The rate of interest is not prohibitive, but the nature of the security is obstructive. The Mamlutdar should personally inquire who want loans, and the security of the village officers should be accepted.

Ratnagiri.—Combined with peaceful times, the khoti tenure has certainly benefited the Concan. Vast areas of cultivable land have actually been made by the khotes or their tenants aided by them. Hundreds of acres of salt swamps have been converted into valuable rice lands, and thousands more await capital. The Land Improvement Act has been hitherto inoperative in Ratnagiri. If it is not to remain a dead letter, the rules for granting loans under it must be considerably relaxed. The boon offered is surrounded by a fence of harassing, irksome, and tedious formalities. The prospect of having to pay an enhanced rent for improvements, does not deter the superior holder in this district.

cost, so long as he does not apply them to interference with the property of others or of Government. Regarding the working of the Land Improvement Act I have no personal experience. But I believe that the people recoil from the idea of involving themselves in money transactions with Government, which is no more than what I should expect.

improvements on reasonable terms. Some officers think that this arises from fear of the landowner to offend the money-lenders by borrowing from Government: some from reluctance to place himself under an obligation to Government or its subordinate officers; some from a feeling, certainly common among the Hindu peasantry, which leads them to prefer, to much more favourable terms which they know they must fulfil punctually, far harder ones which they think there may be some chance of partially evading or of

postponing the fulfilment of. All of these causes may have some influence, but I am disposed to think that a cause already referred to has most to do with it: that the people do not care to take the trouble and risk of making improvements for the benefit of their creditors.

With regard to the construction of irrigation wells (certainly valuable as a safeguard against famine, though not an absolute protection, wells being apt to fail when most wanted, and also as increasing the productive power of the land), a plan has often struck me which it might be worth while to try.

The dry-crop assessment of land in the Deccan suitable for well irrigation may be taken at about one rupee an acre. If irrigated by a well, it would certainly fetch on the average Rs. 8 an acre rent, and this is what a saucar who advances the money for a well calculates on at least getting. Now, a two-kos well will irrigate about 7 acres (on the average of crops wanting more or less water); and the rent due to the well, extra to assessment, is thus Rs. 49 a year,

or 5 per cent. on Rs. 980. The cost of a well, of course, varies very much with the nature of the rock, the depth of water, &c. But I have usually found builders willing to take a contract for the construction of a two-kos well for Rs. 500 to Rs. 750. Taking the higher figure, it is evident that Government might construct wells and get 5 per cent. on the outlay, even allowing that 25 per cent. of the wells (a large proportion) turn out useless. Now, it seems to me that Government might very well construct a well for a peasant on his agreeing to pay the required rent in addition to his assessment, on the condition that he might at any time buy the well off Government at cost price, plus a per-centage to cover cost of failures. It would, of course, be necessary that he should execute a transfer of his land to Government on these terms, so as to bar the lien of any other creditor on it. I understand that this system has been tried with remarkable success in the Bhaunagar State; and it might be worth the while of the Commission to obtain details from Mr. Percival or from the Durbar.

SINDH.

Landholders in Sindh are, of course, constantly cutting new irrigational channels of the smaller class. Canals of any size are undertaken by Government only. Wells are constructed by private individuals to the number of about 90 annually on the average. The cost of constructing a well for irrigational purposes varies from Rs. 250 to Rs. 500. The area in which wells can be profitably made is limited, consisting of a strip of land bordering on the river. Here water is near the surface and abundant. Farther from the

river the well has to be sunk deeper, and the water is, of course, less abundant, and is raised at greater expense. These facts, coupled with the question of capital, limit the construction of wells. The tenure being absolutely secure, and the entire returns arising from improvements effected at private expense being guaranteed to all landholders by law, there is every inducement to the agriculturist to invest capital in such improvements as wells and canals.

MADRAS.

In Ganjam the ryots of either Government or Zemindari lands are not in the habit of carrying out any improvements beyond making shallow tanks by throwing dams across watercourses.

In Vizagapatam much activity is reported to have been shown of late by the ryots in Government taluks in sinking private wells, which are roughly dug at a small cost, water being found near the surface; but owing to the insecurity of their tenure the ryots in Zemindari and Inam lands hesitate to sink their capital on agricultural improvements.

From the Kistna district it is reported that between 1871-72 and 1876-77 no less than 1,000 wells have been sunk by private capital by ryots holding direct from Government, but the Zemindari ryot is deterred by the insecurity of his tenure from carrying out material improvements himself.

In Nellore the ryots and the tenants of Zemindars are said to be in the habit of carrying out material improvements, such as the digging of wells; but sub-tenants are not.

The Collector of Cuddapah says:—"The holders of the tenures directly under Government (that is, Ryotwari, Inam, Shrotriam, and Jaghir) do make material improvements to their lands by digging wells and channels, &c., as their tenure is secure. In cases of sub-tenures the reverse is the case."

In Kurnool numerous wells are reported to have been sunk, and the ryots are said to be in the habit of digging wells in their lands wherever possible.

In the same way, from North Arcot the Collector writes that the great mass of the Government ryots are poor and cannot afford to dig wells at their own expense; but well-to-do ryots are in the habit of improving their lands by constructing wells and small tanks. Ryots in the Kalahasti Zemindari seldom attempt to lay out capital on any permanent improvement of their holdings, their tenure being so precarious.

The Collector of South Arcot reports that the Tahsildars of the district estimates that Rs. 3,39,027 were spent between 1871-72 and 1876-77 by Govern-

ment ryots in the improvement of their private sources of irrigation. He considers that the security of the tenure under Government induces many a poor, hard-working ryot to dig a well in his land. With regard to Zemindari and similar lands he reports that there is no information on record to show what outlay has been made on improvements.

With regard to Tanjore, the Collector reports that the chief estates are lands watered by the Cauvery, and therefore supposed by their owners not to require improvements at any great cost. He also remarks, apparently of the district generally:—"Most of the ryots are poor, and barely get enough to live from hand to mouth." The Board read with much surprise this statement regarding the wealthiest district of the Presidency; but as ryots in Tanjore are usually called Mirassidars, the explanation seems to be that the Collector is referring to the large class of labouring tenants, of whom he elsewhere writes:—"The ryot-vari tenants are generally Poracudies, having no occupancy right and cultivating on behalf of the Mirassidars. They get from twenty-five to thirty per cent. of the gross produce as waram."

In his reply to this question, the Collector of Trichinopoly deals with sub-tenures only, and remarks that tenants of Inam and Zemindari lands scarcely ever improve their land, as they are not permitted to enjoy the benefit of such improvement without their assessment being raised.

The Collector of Madura states: "The holders of land in this district make improvements whenever they have money to spare, but unfortunately such cases are very few. The tenures prevailing in the district are not obstructive to such investments, but poverty is in their way." The Sub-Collector says: "The holders under proprietary tenures are constantly extending wells in all directions. We have no canals, but where channel irrigation is possible, such holders are only too active to take advantage of it, whether with or without regard to others' rights."

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"Security of tenure is the great affecting cause, for a man will expend his whole capital to provide himself with a well in ryotwari or otherwise secure land." He also considers the want of a proper method of examining for springs to be a great obstacle in the way of well-sinking, causing much loss of money and many disheartening failures.

The only improvement ever carried out in Coimbatore is the digging of wells. The district being chiefly ryotwari, there is no insecurity of tenure, but poverty stands in the way, as more than half the ryots pay less than Rs. 10 annual assessment, and are probably in debt far beyond the value of their lands. As many as 1330 new wells were dug, however, between 1871-72 and 1876-77 without advances under the Land Improvement Act.

The Collector of South Canara considers that in that district, with its copious and regular rain-fall, there is no scope for improvements of land on an extensive scale; proprietors and mulgeni tenants, however, carry out material improvement within the limits of their own resources, loans being seldom contracted for the purpose. More would be done if the farm-stock could be improved by the introduction of a superior breed of cattle.

The Collector of Malabar states that not much money is laid out on improvements "owing partly to ignorance and partly to the habit of the majority of the proprietors of rack-renting their tenants and rejecting them without sufficient cause. In consequence of the insecurity of the tenure and the inadequacy of the rates allowed for improvements, arising from the present state of things, the mortgagee finds it his interest to get out of the landholder during the time of his lease as much as he can, giving back to it in the shape of manure, &c., as little as possible."

From the above it is clear that, as might have been expected, insecurity of tenure forms an almost absolute bar to improvement, though the Collectors of Vizagapatam and Nellore report that in Zemindaris in which tanks are neglected, the ryots are driven to supplement their ruined irrigation works with wells. The extent to which insecurity of tenure prevails is indicated in the reply to the preceding question. With regard to Government ryots and others whose tenure is secure, poverty is frequently reported as limiting improvement. This is, of course, true; a man cannot carry out improvements when he has not the means to do so, but it would be a mistake to infer from this that improvements in any way keep pace with means. The contrary seems rather to be the case. Neither in the replies to this question, nor in those to question 4 is there any testimony to a desire to effect improvements being a characteristic of the Zemindars and

large proprietors, and in the list given below of districts in which there are a large number of private wells in Government and Inam holdings, it will be observed that the percentage of holdings with an assessment of less than Rs. 10 to total holdings, is almost invariably above the average for the Presidency, viz., 64.29; in other words, wells are most abundant where small holdings are most common:—

		Number of private wells.	Per-centage of small holdings.
North Arcot	-	52,490	73.63
South Arcot	-	51,468	66.79
Coimbatore	-	47,591	70.94
Salem	-	33,237	73.61
Tinnevely	-	28,429	62.64
Cuddapah	-	27,538	70.73
Madura	-	24,174	72.97

Of course the number of wells is primarily due to the low average rain-fall and other climatic conditions, and not to the number of small holdings; but the table is instructive, as tending to show that there is truth in the general impression, that the average South Indian cultivator will give both money and labour even under adverse circumstances, when he finds it absolutely necessary to do so to gain a livelihood, but not otherwise.

Prior to the recent famine the effect of the Land Improvement Act may be said to have been practically nil. During the famine the following advances were made under the Land Improvement Act of 1871:—

		Ordinary. Rs.	Famine. Rs.
1876-77	-	4,435	44,538
1877-78	-	1,56,367	13,67,520
Total	-	1,60,802	14,12,058

But the Board have no doubt that it is desirable that the operation of the Land Improvement Act should be facilitated as much as possible, but the rules under which advances are to be made have recently been revised after much consideration, and until they have had a fair trial, the Board are not prepared to submit any further proposals for facilitating the working of the Act or enlarging its scope.

The interest charged on advance under the Land Improvement Act is 6½ per cent., and compares so favourably with the ordinary market-rate of interest on transactions of the kind that the Board have no hesitation in stating that no ryot otherwise desirous of obtaining an advance would be deterred by a consideration of the rate of interest charged.

MYSORE.

MYSORE.
Mr. Ricketts.

As a broad rule landholders are not in the habit of carrying out material improvements, though in the natural course of prosperity many wells have been dug here and there. Under the native rule there were no inducements to sink wells, and the watered land was charged with water-rate, which often worked a hardship, for though the wells might subsequently have fallen or otherwise got into disuse, it was most difficult for the owner to get his land again charged as dry. It was only after the advent of Mr. Bowring, that special, or rather it should be said the usual concessions were made in the case of new wells. The survey and settlement have, however, put all this on a proper footing, and wells and the natural result, gardens, are springing up in many directions in settled taluks.

Mr. Bowring further offered inducements to private capitalists to expend money on the repairs of ruined or disused tanks. Apparently the scheme prospered at first, but it has terminated in failure owing to the glaring manner, in some cases, in which the holders

tried to evade their responsibilities. In fact, though monied men, the wrong class took up the tanks. The ryots themselves held back. They were fearful of incurring heavy obligations to the Sarkar and were content to let the Sarkar take the initiative and share profits with them.

I am not in favour of making advances under the Land Improvement Act, i.e., as a rule. Those that go in for improvements with borrowed money are generally of a sanguine or flighty nature, and are likely, as not, to throw up in disgust or despair even when success by perseverance and skill is almost within reach. Easily-gotten money is easily spent. The character of Indian agriculture with its cheap prices of produce is such that profits can only be made by the skilful and industrious. The maturing of these qualities will generally end in seeing the possessor with quite enough wherewith to enlarge his operations. Thus progress is gradual and healthy. The sons begin where their fathers left off, and there is none of that inherited wealth which proves oftener

a curse than a blessing. I would not, of course, check improvement, for I see improvement all around me, but I would not artificially aid it. The ryots' wants are simple, and he is sufficiently happy, which after all is the great desideratum. Gradually his wants go on increasing, and his efforts in improved

agriculture, industry, &c. must go on increasing in the like proportion. This result, though gradual, is general; not so the ephemeral acquisition of wealth, when the son generally ends where the father ended, and it is a question whether the acquired wealth will make the possessor happy or not.

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The tenures of land in this district are:—

I. Kandayam, under which fixed assessment is paid in money to the Government, whether the land is cultivated or not, the assessment being subject to revision.

II. Batai, under which the Government gets a share in the produce instead of money assessment, only when the land is cultivated.

III. Kayamgutta, under which whole villages are rented out on a fixed lease, not subject to any revision.

IV. Jodi, or grants of whole villages or lands with partial remission of Government demand, not subject to revision; and,

V. Survamoniya, or grants of villages or lands entirely free from rent.

Number 1 is the main tenure on which lands are commonly held everywhere in this country.

Number 2 now prevails only in unsurveyed and unsettled taluks, and this too with regard to irrigated lands alone.

Number 3 exists to some extent in a portion of the Province; and

Numbers 4 and 5 are to be found in every part of it to a less or more extent. With the exception of lands held under tenure number 2, and those falling under tenures numbers 4 and 5, for which no special alienation is given in the title deed, all others are transferable.

Up to the year 1863 the occupants of lands held under tenure number 1 were to a great extent hindered from carrying out any material improvement to their lands by digging wells or channels, as they had up to that time to pay enhanced assessment when they raised irrigated crops, though at their own outlay. The rates of assessment levied on lands irrigated by such private wells were so many as 68, the maximum being Rs. 23 per acre. This was found to be so ruinous to the ryots that Mr. Bowring, after making a tour in my district, authorised me to reduce the number of rates to five, and limit the maximum rate of assessment to Rs. 10 per acre. This has relieved the ryots to a great extent, but I would yet make further reductions, as I find that the income does not still bear a fair proportion to the outlay, and consequently the ryots are driven to contract debts for the purchase of bullocks, which they have so often to change when employed in lifting water from deep wells. Since Mr. Bowring's order of 1863, which allowed the ryots to sink wells freely in their holdings and enjoy the full benefit of their labour and outlay without extra impost on that account, 967 wells have been sunk in my district, but considering the large extent of lands where wells could be dug yet remaining without them, I think the number is too small, and this I attribute partly to the revision of assessment to which these Kandayam lands are subject after the expiration of the guaranteed term, and partly to the poverty of the people. It therefore appears to be desirable to give further encouragement to the ryots to sink wells in their holdings, and this can only be done by removing the present popular impression, that after the expiration of the term guaranteed by the Survey Department additional tax would be imposed according to the con-

dition in which the land will be found at the time, without reference to the expense incurred in its improvement, and by providing sufficient money annually for making advances to the poor ryots under the Land Improvement Act. Although this Act has been extended to Mysore only two months ago, and I am therefore unable to say now what have been the effects of it, I have not the least doubt of its proving a great boon to the country. The provisions of the Act are, in my opinion, liberal enough in every respect, and I am sure that the benefit of it will be freely availed of by the poor ryots, as the person seeking the advance can obtain it on the security of his own land, when it is sufficient; the interest charged by the Government is very much lighter than that demanded by the Saucars, and the instalments are easy. The Act may therefore stand as it is. I would, however, adopt every measure to encourage the people of the country to spend their own capital on the improvement of their holdings without looking to Government help, and in view of this great discretion should be exercised in making advances under this Act. Much encouragement might be given to the ryots in this respect by doing away with the distinction of "Baghayat" or garden rate, which is higher than the other two rates, viz., dry and wet. Either the dry or wet land may be converted into garden, but it cannot always continue to be so. It depends more upon outlay and labour than upon soil, and what was once a garden may cease to be so when the holder is unable to bear the extra cost and labour required for the purpose. It is only just that those who spend extra money and labour should be allowed to reap the extra benefit, and I would therefore only have two distinctions, namely, dry and wet, and assess the lands according to the quality of the soil and the quantity of water supplied, without reference to the crops raised, whether paddy, ragi, sugarcane, cocoa, or areca nut, &c.

The improvement of land has been checked to a great extent by the orders issued by the Local Government in 1871, modifying those passed by Mr. Bowring in 1863. Copies of those orders are appended to this report. The extent to which the improvement of land is hindered by the order of 1871 which is now in force, can be observed from the fact that between 1864 and 1871, 562 petty ruined tanks were repaired by ryots and others of the country wholly at their own cost, amounting in round figures to Rs. 2,40,000, adding an annual revenue of 14,200 rupees to rupees 3,000 previously derived from lands below them, and 870 wells were sunk; while since 1871 no more than six ruined tanks were taken up by the ryots, and only 97 wells sunk; and this is, in my opinion, undoubtedly due to the restrictions laid down in the order of 1871. It may also be observed here that out of the 568 tanks thus repaired by private enterprise in my district, 90, which were either breached by accident or only partially repaired, have been resigned, the owners being unwilling to incur any further expenditure in consequence of the Irrigation Department having breached or otherwise rendered useless some of these tanks in carrying out the serial system introduced in this country in the year 1872.

Mr.
Krishniengar.

CHAP. I. QN. 11.

CENTRAL
INDIA.

Mr. Wingate.

Bhopal.—Cultivators who break up new land are exempted from rent for three years.

Rutlam.—"Every holder of the above tenure is at full liberty to make any improvements within his own holding, such as digging a well, damming a nullah, or providing any other source of irrigation. He is entitled to enjoy the full out-turn of his field beyond the settled jamma. Moreover he has the assurance of being allowed rent free one-fifth of his improved land in perpetuity after the expiry of the existing term and the renewal of the lease. As an encouragement to increase the means of irrigation, every 'Asamee' is privileged to borrow from the State treasury a sum without interest for digging a well, and to repay the same by easy instalments.

CENTRAL INDIA.

"This system has led to many new wells being dug through the district, and the result is favourable both to the State and to the cultivator."—*Mir Shahamat Ali, C.S.I.*

Manpur.—"The Land Improvement Act is not in force in Manpur. On the contrary, the terms of the settlement in the settled villages debar the making of any advances to the cultivators. An annual grant of Rs. 1,700 has been passed, in the Pargannah budget by Government for some years, to be spent in sinking and improving Government wells in the pargannah, and additional water rates are paid by the cultivators of settled villages on fields irrigated by them from such newly-made wells."—*Pundit Suroop Narain*.

HYDERABAD.

Moulvie Mahdi
Ali.

1. Are the holders of the above tenures in the habit of carrying out material improvements, such as digging wells, or channels necessary in order to use the water in a canal?

Yes, they are, and specially so during the last four years, because of Government having directed that every encouragement should be afforded to the cultivators to sink wells in their holdings, and that if any cultivator offered to construct a well, the Talukdar should grant him a written *hauk* to the effect that Government would not levy any water rate for irrigating his fields for a period of 30 years. During the

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years 1285-86 no less than 2,389 wells were constructed, and 570 were under construction.

2. Are their actions in this respect affected most by the security of their tenure, or by their wealth or poverty?

Hitherto it may be said to have been effected mostly by the insecurity of their tenure, as is proved by the fact of their constructing nearly 3,000 new wells during the four years that encouragement has been offered to them to construct them. In times past the cultivators never appear to have constructed as many wells in so short a period.

CHAP. I. QN. 12.

CHAPTER I.—QUESTION 12.

How far is the landowner's or the cultivator's readiness to improve the land checked by any operation of the law? Is the digging of wells checked in any such way? How far does the expectation of having to pay increased revenue or rent in consequence of any improvement check the execution of improvements?

PUNJAB.

Mr. Gore
Ouseley.

I am not aware of anything in the state of the law which unduly checks an owner's or occupancy tenant's readiness to effect material improvements on his land. The digging of wells is certainly not checked by any existing law. As to how far the expectation of having to pay increased revenue or rent in consequence of effecting improvements may check the

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execution of those improvements, this depends on a variety of circumstances, such as the original cost, the length of time the settlement or lease has to run, the probable annual profit, the disposition of the individual owner or tenant, his age, circumstances, &c., &c.

Col. Davies.

I am not aware that there is any provision of the law which checks improvements. The Punjab Tenancy Act sufficiently protects the rights respectively of the landlord and of the tenant. But ignorance of the provisions of the law in the case of the latter undoubtedly has the effect of checking improvements, for tenants with rights of occupancy are not as a rule aware that they have any right to make permanent improvements, and the prevailing idea is that a person of this class who sinks a well thereby acquires a proprietary right in the land in his occupancy, or in so much of it as is irrigable by the well, and proprietors therefore will not permit their tenants to make such improvements. The best way to remove this ignorance would be to embody the provision of the law on the subject in the administration paper of villages, but unfortunately we are forbidden to enter in these papers any matter expressly provided for by law.

In the case of proprietors there can be no doubt that the fear of having to pay an enhanced assessment (notwithstanding the promulgation of the rules relating to pattas) operates in checking improvements towards the close of the period for which a settlement has been made. But this cannot be said to have any permanent effect in restraining the investment of capital in improvements. The case of tenants is different; besides ignorance of their rights, there is always before them the knowledge that they may have to pay a higher rent if they sink a well or otherwise increase the productive capacity of their land, and this knowledge must have the effect of permanently checking any disposition on their part to lay out money in improvements.

ORTH-WESTERN PROVINCES AND OUDH.—See under Question 11.

BENGAL.

As regards landowners and tenure holders as distinguished from actual cultivators, all their rights are secured to them by law, and the demand of Government revenue is fixed and unalterable. There is nothing, therefore, in the state of the law to prevent their making such improvements on their estates as they consider feasible. But, as a class, they are too many of them merely rent collectors, taking no interest in the material welfare of their lands, or in the prosperity of those who cultivate them. They look no further than to exact the uttermost farthing from those who till the soil. If they dig wells, as they do in Behar, it is that the rent of the lands watered from them may be increased.

The insecurity of the cultivator's tenure, his poverty, and the fear of enhancement together, may prevent him from digging wells and making improvements where they are feasible, but where it has been the custom from time immemorial to resort to artificial irrigation, he will contrive to do so. But of the great body of the ryots of the country, except in Eastern Bengal, it may be said that they have no ambition, no wish to improve their lands, or to do more than to live as their forefathers lived before them. Nothing short of force could stir their apathetic nature to move out of the established groove in which agriculture runs.

CHAP. I. QN. 12.

BENGAL.

Mr. Toynbee.

CENTRAL PROVINCES.—See under Question 11.

BOMBAY.

The opinions of the officers consulted on this question are epitomised below:—

Kaira.—There is nothing in the law to check improvements. The conditions of proprietary tenures are all fixed and their liabilities settled by legislation. Those of the survey tenure and the 30 years' settlement do not act as a check. Towards the end of the term of settlement they may temporarily.

Thana.—No provision of the law checks improvements. But a landlord is checked by the rule that if he charge an increased rent as interest on improvements, he cannot get the assistance of the revenue authority* to recover the increment above the survey assessment, and must go to the Court.

Kaladgi.—No such operation of the law is known. Possibly the expectation of a revision at the end of a term of settlement may temporarily deter from improvements.

Dharwar.—The strict provisions regarding loans under the Land Improvement Act check improve-

ments by means of advances. The approach of a revision defers improvements temporarily.

The digging of wells is in no way checked by law. The people are now well aware that they will not be required to pay increased assessment on account of improvements. So far as newly sunk wells were concerned, this point was not definitely settled till some 10 years ago. Notwithstanding, and though before that the people had no reason to expect that they would be exempt from additional assessment on revision, well sinking went on actively. The very low rate of extra assessments on well irrigated land above that on unirrigated land fixed at the first settlement, compared with that commonly before in force, induced the people to have no fear of what might occur on revision at the expiration of the current settlement, up to which time they had an express guarantee of no increase of assessment.

* Nairne's Handbook, p. 177.

MADRAS.

From the replies to questions 10 and 11 it will have been seen that the uncertainty of the legal position of a Zemindari ryot tends to check the execution of improvements, as does also his liability to have his rent enhanced by his landlord for improvements carried out by means of private outlay.

In the case of a Government ryot there is no insecurity of tenure tending to check the execution of improvements, nor is there any law in force in the Madras Presidency having any such effect. The most distinct assurances have been given to Government ryots that the tax on lands cultivated by means of wells constructed at their own cost will never be

enhanced, unless on a general revision of the district rates; and that in such revision any modification in the assessment of lands so improved will be irrespective of the increased value conferred upon them by their holders.

It has hitherto been considered equitable to charge a water-rate when a well has been sunk on irrigated land or within 10 yards of a tank, river, or channel on unirrigated land; but the Government have lately directed that even these are to be treated like other private wells, and the constructor given the full benefit of his improvement.

MYSORE.

Pumkur.—Four of the taluks in this district have been surveyed and settled, and in the others survey operations are being rapidly completed. By the Mysore Government Guarantee, for 30 years after the settlement, dry crop land which may be converted into wet crops solely at the cost of occupiers or cultivators will not be subjected to any extra assessment whatever, nor will any extra tax or cess be imposed on account of

fruit or other trees planted hereafter by occupiers or cultivators on account of superior crops being grown. If a well is dug by the cultivator, or a watercourse (*kâlve*) made from a stream, the water of which is not the produce of a work constructed at the expense of Government, no additional assessment will be imposed again.

RAJPUTANA.

Ajmir.—There is a premium on the digging of new wells. A man who digs a new well can get a *pottah* from the district officer, which will protect his land

from increase of assessment at next settlement, and for the term of that next settlement.

MADRAS.

The Board of
Revenue.

MYSORE.

Mr.
Meiklejohn.

RAJPUTANA.

Mr. L. S.
Saunders.

CHAP. I. QN. 12.

CENTRAL
INDIA.

Mr. Wingate.

Bhopal.—The payment of increased revenue prospectively does not discourage wells and tanks, the leases being always for long periods.

Rutlam.—"During the term of the lease every landholder is entitled to enjoy the full income of his improvements. In this case no expectation of having to pay increased rent in consequence of any improve-

CENTRAL INDIA.

ment will check the execution of improvements, because before the expiry of the lease the owner is much more than repaid for any expenses he may have incurred on this account; or if the lease for digging a well is taken from the outset, he will enjoy a reduction of one-third or one-fifth of the revenue, as may be the condition, in perpetuity."—*Mir Shahamat Ali.*

CHAP. I. QN. 13.

CHAPTER I.—QUESTION 13.

What is the general incidence of land revenue on the cultivated area, both for the arable land as a whole and for the different classes of such land (irrigated, dry, &c.)? What proportion does such revenue bear to the value of the gross produce? Is the incidence on the various classes of land fairly distributed, or would you propose any re-adjustment of it? When was the assessment fixed? Has there been any practical difficulty in realizing the land revenue as now assessed? At what dates are the instalments of revenue payable, and what relation do these bear to the ordinary periods of harvest or of realization of rents, as the case may be? Do the several instalments bear a fair proportion to the value of the several harvests from which the revenue or rent has to be made good? What rate of interest, if any, is charged on land revenue in arrear?

PUNJAB,

Major Wace.

What is the general incidence of land revenue on the cultivated area, both for the arable land as a whole and for the different classes of such land (irrigated, dry, &c.)? What proportion does such revenue bear to the value of the gross produce?

In a country such as the Punjab, the major portion of which passed from native to British rule only 30 years ago, the incidence of the land revenue can be stated from three different points of view,—its present incidence as compared with the revenue levied before British rule, the actual cash rates per acre now levied, and the share of the produce which they may be assumed to absorb. Of these three methods of viewing the subject, the first is probably the one entitled to most weight; it is certainly the point of view from which the subject must most commonly be regarded by the agriculturists themselves; and it will readily be admitted that the relation of the State's present demand from the land to the standard sanctioned by the immemorial usage of the country up to British annexation is of at least equal importance to that of its actual present incidence viewed by itself.

On the question of the incidence of the land revenue under the Native Governments, the best testimony is that of those officers who controlled the Sikh Government from 1846 to 1848, during the three last years of its existence. Similarly we can refer to the testimony of those officers, to whose lot it fell in the first years of our administration in the Punjab to reduce the standard of the Sikh Government to such a demand, as they judged necessary for the prosperity of the agricultural classes.

Of such testimony selections are appended to this reply. It is impossible to read these selections and to doubt the substantial accuracy of the following statement, which I quote from the Punjab Administration Report for 1875-76:—

"The Sikh system of assessment was that the State as proprietor-in-chief took all that it could get; and it did take often as much as one-half the gross produce of an estate, besides a multitude of cesses under the names of *rasúm*, *nazrána*, &c., and exorbitant fines on succession."

Looking at the evidence before us, it is safe to assert that the Sikh land revenue collections were usually not less than from two-fifths to one-third of the gross produce, independently of the irregular cesses just referred to.

The usual method by which the land revenue was brought into the State's coffers was by lease of large tracts to local governors, or small tracts and villages to local headmen or petty farmers. These men were

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virtually renters, not collectors. The principle they followed was to collect as much and pay as little as possible. In a bad year they would collect not less than the amount of their lease, and in a good year much more. Thus, though much less than the value of what the agriculturists paid reached the Government's chest, the local managers and farmers took the full value of that share, and a practically unlimited number of additional exactions. I need not here repeat the details contained in the papers appended. But as we read the accounts of such a system written by those who were eye-witnesses of it, we can scarcely understand how the people tolerated it.

The object of our summary settlement was, 1st, to fix the amount of the State's demand; 2ndly, to define the quota thereof payable by each contributor; and 3rdly, to give a small immediate relief in its amount—a relief which was required by the severity of the previous collections and by the depressed state of the country, consequent on misrule.

The object of the first regular settlements was of a similar character. But made as they were some five or six years after the previous ones, our officers possessed a better experience of the amount of revenue that could be demanded consistently with the prospects of each tract. Reductions of 20 and 30 per cent. on the last Sikh collections, and even on our summary settlement, were commonly found to be necessary; a state of affairs which it is now-a-days difficult to conceive. It is true that the instructions under which our revenue officers worked, impressed on them the necessity of moderate assessments, and that the accepted theories required them to make all assessments not exceeding two-thirds of the net assets or rent. But their reports show that there then existed no means of applying such a standard; that, difficult as it now is to ascertain the average produce of land, it was then far more difficult; and that practically their assessments depended on their personal judgment of what it was fair and wise to demand, a judgment mainly based on the collections of the years preceeding the settlement. There is seldom any indication in the reports that revenue reductions were lightly given, but complaints that they had been delayed too long were not uncommon.

During the last 20 years other influences have operated to lighten the incidence of the revenue; viz., higher prices and well established increase in cultivation and irrigation. It is believed that on the revised settlements the new assessments usually fairly appreciate increased irrigation; though a serious shortcoming in this respect undoubtedly took place in the re-assessment of the Amritsar and Lahore Divisions between 1862 and 1868. It is more difficult to

make the assessments follow increased cultivation. The system of assessment, unlike that of Southern India where each field is separately leased, gives a lease to each village; which lease usually covers all the village land, cultivated and uncultivated. Large increases of cultivation occur during the currency of the lease; and experience shows that at the lease's expiry much caution is required in increasing the State's demand proportionately. Subject to such caution the increase of the land revenue demand proportionately to the increase in cultivation is insisted on at the expiry of each lease; but the value of the increased cultivation, consisting as it not uncommonly does of the poorer soils, is usually less than the ratio it bears to the old; and it would consequently usually be wrong to argue that a revised assessment is lighter than the preceding one, merely because the average rate of its incidence on the whole cultivation is lighter. The influence of prices is in their present unsettled state still more difficult to follow. I have given an account of this subject in my reply to question 16, which it is not necessary here to repeat. But it is pertinent to point out that the position of a revenue officer charged with fixing the revenue lease of a village for a term of years is wholly different from that of his successor, who towards the close of that term will perhaps inquire what proportion of the produce the lease has actually absorbed. It is impossible to make a cash assessment of the revenue, except on the basis of prices which have usually prevailed in past years; but owing to the steady and continued rise in values which has prevailed for 20 years past, the actual value of the produce has nearly always been greater than was assumed as the basis of our assessments.

It is only by bearing in mind these considerations that we can understand the great difference which now exists between the share of the produce which the Punjab agriculturist paid to the State, or rather to the State's farmer up to 1846, and that which he now pays to the British Government. Commencing in 1849 with a standard of one-third of the produce, a period of low prices, combined with other considerations affecting the welfare of a newly-conquered and previously much-oppressed country, compelled us to reduce that standard successively to a fourth and a sixth; and after having done this from the year 1860, a period of high prices has set in under which undoubtedly our assessments absorb very much less than the standard share of the produce on which they were framed.*

The standard share, which was aimed at in the settlement of each district, so far as it can be given, will be found in the appended statements of the average incidence of the revenue in each district. But in estimating its value and its meaning some additional data need to be borne in mind, over and above those already stated.

The preamble to the Punjab Land Revenue Act (33 of 1871) asserts that "the Government is by law entitled to a proportion of the produce of the land of the Punjab to be from time to time fixed by itself." Arbitrary as such an assertion may sound, it is a strictly correct historical statement, as this reply and the papers appended abundantly show. Nor was it inserted in the Act on theoretical grounds; it merely stated the case as we found it at annexation and as the people continue to regard it. But when a revenue officer speaks of the State's demand as being equivalent to a certain share of the produce, the statement is slightly misleading, harmlessly and imperceptibly perhaps to himself, but materially so to economists and to persons unacquainted with the country. In the depressed condition of the

country which preceded our rule, little of the produce of land had any marketable value, except grain and butter. This remark does not apply of course to market garden cultivation near towns, nor to such crops as sugarcane, cotton, spices, and the like. But the great mass of the cultivation in a depressed condition of the country is confined to cereals; and nine-tenths (or more) of the marketable produce consists of their grain, wood, grass, straw, milk and other items which add much to the rent of the land in more prosperous conditions of agriculture have no marketable value. It is of the yield of grain that both our former and present officers for the most part speak, when they describe the State's demand as a given share of the produce.

The complete predominance of cereals in the agriculture of the country remains to this day; but the tracts are now few and exceptional in which their grain is the only marketable product; straw, fodder, and butter have now usually a well-established value; and the number of petty items which contribute to an agriculturist's income is increasing. Whatever may be the abstract claim of the State to share in such new sources of profit, and however much our assessing officers may desire to see that a State more moderate than any of its predecessors succeeds in realising the full standard so moderately fixed, in practice it is very difficult to make our assessments keep pace with prosperity of this nature. There are no competitive rents, which might bring to account such accretions to the annual value of land; our assessments are in the form of long leases, and deal directly with petty proprietors cultivating their own lands; and the customary system whereby the State's demand is based on a stated share of the produce does not lend itself easily to the extension of that demand to items of produce not previously reckoned. I do not urge that we are in any way bound to yield the State's claim to share in all marketable produce; I merely assert from personal experience that it is practically difficult to make the assessments follow such new sources of profit; and that, as the agricultural prosperity of the country rises, there is in fact a practical increasing divergence between on the one hand the share of the produce which the State claims and which its officers endeavour to levy by their cash assessments, and on the other hand the proportion which those assessments really bear to the whole value of the produce.

If I have succeeded in describing intelligibly these influences, the reader will not be entirely unprepared for the conclusions arrived at by Mr. T. H. Thornton in an interesting paper appended to this reply (though not prepared in connection with the inquiries of the famine commission), as to the real value of the agricultural produce of the Punjab, the profits of the cultivator and the share absorbed by our land revenue assessments. He finds that the land revenue is one-sixth of the profits, and one-sixteenth of the gross produce of the whole Province.

Such an assertion, when compared with the efforts of our settlement officers to assess a revenue which shall nearly represent one-sixth of the produce in all the more fertile districts of the province, undoubtedly opens a considerable field for discussion. But if all the influences which I have above described be duly weighed, especially the effect of increased cultivation and of rising prices towards lightening the incidence of leases fixed for 20 or 30 years, we shall find reason to admit that the assessment in most years probably now absorbs only one-tenth of the whole produce of the land which pays it (the term produce being understood in its fullest sense).

To proceed to the question of the incidence of the revenue expressed in money, a statement appended shows the average incidence in each district reckoned on the whole cultivated area; and three other statements show the rates paid by irrigated lands in each district, by moist alluvial lands, and by the ordinary dry lands dependent on rain. These rates are so various, that an attempt to summarise them in narrative form would be of questionable utility.

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Major Wace.

* The Financial Commissioner desires to observe that though the Lahore and Amritsar Divisions and one or two other districts were assessed between 1860 and 1872 on a standard of $\frac{1}{3}$ produce, the standard now observed (e.g., in the late assessments of the Mooltan, Derajat and Delhi divisions and Jhelum districts) is $\frac{1}{4}$ assets, i.e., $\frac{1}{4}$ the customary rents, which as a matter of fact are usually produce rents.

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The question how far the incidence of the revenue varies from year to year is one of great difficulty. There are no data from which such a question could be answered. But whenever the annual variation in the area of cultivation, or in the area of irrigation are such as to cause great variations in the incidence of the assessment, it is the accepted policy of Government to modify the ordinary fixed character of its settlements. Thus on the Bári Doáb Canal irrigated revenue is levied not by fixed lump assessments on each village, but by acreage rates on the area actually irrigated each year. The same system is in force on the Upper Sutlej irrigation canals in the Lahore and Montgomery Districts. In the inundation canals of the Mooltan division and Dera Gházi Khan district, though the revenue payable by each village is assessed at a fixed amount, the assessment books show how much of this is charged for canal irrigation; and that share is not leviable in any year in which the irrigation has failed. In the same way in the Mooltan, Muzaffargarh, Dera Ismail Khan, and Bannu districts, where the annual variations of cultivation in the riverain lands situate in and on the banks of the Sutlej, Chenab, and Indus rivers are of a serious character, the assessment payable by each village for such lands is not fixed, but is charged at the settlement acreage rates on the area actually cultivated each year. The same system is also applied to the cultivation of the Dera Ismail Khan district, which depends on the capricious and uncertain torrents that run down from the Sulaiman Range. These fluctuating assessments have been in force about 10 years on the Bári Doáb Canal, and five on the Upper Sutlej Canals. In the other instances they have only lately been introduced.

It only remains to notice one point connected with

the incidence of the land revenue, which has often provoked remark. It frequently occurs that heavier rates are paid by the more industrious villages and lighter rates by their less skilful neighbours occupying lands of similar natural advantages. It is practically impossible to adjust inequalities of this nature; and it is politically inexpedient to attempt to do so. The more skilful agriculturists pay the higher rates with more ease than their less able neighbours pay the lower rates; and also after paying the higher rates have a much larger margin of profit left to them. The less skilful agriculturists on the other hand are absolutely unable to pay the higher rates. In dealing with these matters it is impossible to be guided solely by theories of equality of assessment. When differences of this nature are inquired into, they are found to have their origin in the different antecedent circumstances of each class, and not to be merely due to present differences of agricultural skill. So long as the more industrious class is treated with real moderation, they have no just claim to hold their land at rents far lighter than any ever before paid by them. On the other hand, agriculturists, from whom our predecessors have uniformly levied comparatively low rates, have a substantial ground of objection against the enhancement of old established standards of rent merely on theoretical grounds. Every man's right in the soil, and no less that of the State, is to be decided primarily by what he has in fact enjoyed during past years. Any attempt to ignore this principle in our assessments in favour of theoretical equality would not only be financially injurious, but it would be distinctly opposed to the common feeling of the country, which is built up on and permeated by class distinctions to a degree unsurpassed in any other.

AVERAGE INCIDENCE of the LAND REVENUE ASSESSMENT in the PUNJAB per acre cultivated.

[Note.—Column 7 of this Statement is copied from Statement No. 8, appended to the Punjab Administration Report for 1876-77.]

Division.	District.	Average rain-fall per annum in inches.		Per cent. of cultivation irrigated.	Land Revenue demand for 1877-78, including fluctuating items.	Average incidence of land revenue per acre cultivated.	Share of the Gross Produce which the Assessment, when made, was intended to cover, so far as can be stated.
		Of recording station with highest average.	Of recording station with lowest average.				
Delhi	Delhi	30.6	25.5	37	8,89,461	1 12 3	} $\frac{1}{8}$.
	Gurgaon	33.6	28.6	19	11,99,255	1 2 3	
	Karnal	30.4	18.0	39	6,78,693	1 4 9	} Not stated.
Hissar	Hissar	17.1	14.7	5	4,24,158	0 4 9	
	Rohtak	20.2	18.8	13	8,83,291	0 15 10	} $\frac{1}{8}$.
	Sirsa	14.3	12.7	3	1,79,297	0 3 1	
Umballa	Umballa	43.6	25.5	18	7,79,413	1 6 5	} Do.
	Ludhiána	25.3	24.0	17	7,91,331	1 5 3	
	Simla	72.6	65.1	6	14,705	1 9 6	} $\frac{1}{8}$.
Jullundur	Jullundur	29.8	25.5	33	12,18,040	1 15 3	
	Hoshiárpur	37.9	33.7	17	12,93,802	1 12 7	} $\frac{1}{8}$.
	Kangra	125.6	40.1	27	6,14,567	1 5 3	
Amritsar	Amritsar	24.9	23.1	39	8,35,762	1 5 1	} Not stated.
	Siálkot	39.0	24.2	50	11,09,873	1 6 10	
	Gurdáspur	54.1	27.0	16	10,77,221	1 7 9	} $\frac{1}{8}$.
Lahore	Lahore	21.8	18.5	37*	5,94,693	0 9 7	
	Ferozepore	26.6	13.3	14	5,06,096	0 8 3	} Not stated.
	Gujránwála	26.3	20.3	70	4,63,661	1 1 3	
Rawalpindi	Rawalpindi	62.0	31.5	2	6,89,029	0 12 0	} Not stated, perhaps $\frac{1}{8}$.
	Jhelum	18.6	12.4	3	5,88,918	0 12 2	
	Gujrat	30.8	26.1	13	5,72,129	0 13 2	} $\frac{1}{8}$.
	Shahpur	15.7	11.8	64	3,89,336	0 15 10	
Mooltan	Mooltan	7.3	5.1	79	5,46,003	0 13 10	} Not stated.
	Jhang	13.0	10.3	69	2,97,594	1 1 9	
	Montgomery	8.7	6.3	62	4,08,867	0 12 2	} $\frac{1}{8}$ (?).
	Muzaffargarh	13.1	6.1	63	5,27,558	1 5 2	
Derajat	Dera Ismail Khan	8.4	7.9	32	3,97,381	0 12 10	} Varies generally from $\frac{1}{8}$ to $\frac{1}{10}$.
	Dera Ghazi Khan	9.6	1.2	57	3,49,139	0 5 2	
	Bannu	12.0	9.5	15	4,35,280	0 15 3	} $\frac{1}{8}$.
Peshawar	Peshawar	27.1	12.9	25	6,75,693	0 13 11	
	Kohat	20.2	20.2	38	95,646	0 10 4	} Irrigated land, $\frac{1}{8}$. Unirrigated land, $\frac{1}{10}$.
	Hazára	46.3	35.9	10	2,22,191	0 13 0	

* It is believed that this is understated. The revised Settlement Report (of 1865-9) says that 43 per cent. is irrigated, viz., by wells 35 and, by canals 8. The latter has increased since settlement. 7 per cent. also is sailab.

INCIDENCE OF LAND REVENUE.

(A.)—SUMMARY of the REVENUE RATES assessed on IRRIGATED LANDS.

[Rates per acre, except where otherwise stated.]

Div. DIVISION.	District.	Source of Irrigation.	SETTLEMENTS MADE BEFORE 1862.			SETTLEMENT MADE SINCE 1862.		
			Year.	Highest.	Lowest.	Year.	Highest.	Lowest.
Delhi	Delhi	Wells -	—	Rs. A. P.	Rs. A. P.	1878	Rs. A. P.	Rs. A. P.
	Gurgaon	Canals -	1838	3 2 0	2 6 0	1878	4 0 0	2 4 0
	Karnal	Wells and canals	1849	4 0 0	1 8 0	1876	3 0 0	2 12 0
Hissar	Hissar	Do.	1847	2 12 0	2 6 0	1878	3 8 0	1 8 0
	Rohtak	Canals -	1864	1 4 0	0 12 0	—	2 14 0	1 14 0
	Sirsa	Wells and canals	—	—	—	1878	—	—
Umballa	Umballa	Wells -	1856	1 0 0	1 0 0	—	2 12 0	2 0 0
	Ludhiána	Wells -	1855	5 8 0	1 0 0	—	—	—
	Simla	Cannot be given.	—	—	—	—	—	—
Jullundur	Jullundur	Wells -	1851	6 0 0	2 8 0	—	—	—
	Hoshiárpur	Do. -	1851	5 4 0	2 0 0	—	—	—
Amritsar	Kangra	No rates framed.	—	—	—	—	—	—
	Amritsar	Wells and canals	1854	4 5 3	0 14 6	1865	Do.	Do.
	Siálkot	Wells -	1854	3 4 0	1 1 0	1865	Do.	Do.
	Gurdáspur	Wells and canals	1854	4 7 0	1 2 11	1865	Per well.	Per well.
Lahore	Lahore	Wells -	1854	2 0 0	0 9 0	1868	14 0 0	6 0 0
	Ferozepore	Do. -	1856	1 6 0	1 3 0	1872	Per well.	Per well.
	Gujránwála	Do. -	1854	2 0 0	1 0 0	1866	12 0 0	8 0 0
Rawalpindi	Rawalpindi	Wells -	1864	7 0 0	1 8 0	—	(Muktsar and Mamdot only).	Per well.
	Jhelum	Do. -	1857	5 4 0	2 5 0	1878	20 0 0	8 0 0
	Gujrat	Do. -	1858	2 6 0	1 2 0	1868	—	—
	Shahpur	Do. -	1854-66	2 8 0	1 0 0	—	Not stated.	—
Mooltan	Mooltan	Wells and canals	1855-59	2 8 0	0 12 0	1878	3 2 0	0 8 0
	Jhang	Wells -	1856	2 4 0	1 2 0	1878	1 8 0	1 4 0
	Montgomery	Do. -	1856	1 12 0	1 0 0	1872	Per well, Rs. 30	Per well, Rs. 10
		Per well.	—	50 0 0	2 0 0	—	—	—
		1856	3 0 0	0 12 0	—	—	—	—
Derajat	Muzaffargarh	Canals -	1856	—	—	1872	3 0 0	0 12 0
	Dera Ismail Khan	Wells and canals	—	—	—	1878	1 3 3	0 14 0
		Wells and perennial streams.	—	—	—	1878	2 8 0	0 4 0
Peshawar	Dera Gházi Khan	Wells and canals	—	—	—	1874	5 0 0	0 11 0
	Bannu	Do.	—	—	—	1878	10 0 0	0 8 0
	Peshawar	Wells	—	—	—	1878	10 0 0	0 8 0
		Canals -	—	—	—	1878	12 0 0	2 0 0
	Kohát	Wells -	—	—	—	1878	6 0 0	1 14 0
		Streams and channels and the Tol.	—	—	—	1878	6 8 0	1 12 0
	Hazára	Wells, &c. -	1861-62	8 0 0	1 0 0	1872	8 0 0	1 0 0

(B.)—SUMMARY of the REVENUE RATES assessed on SAILAB LANDS, i.e., MOIST ALLUVIAL LANDS in the VICINITY of or ANNUALLY INUNDATED by RIVERS.

[Rates per acre.]

Division.	District.	SETTLEMENTS MADE BEFORE 1862.			SETTLEMENTS MADE SINCE 1862.			Remarks.
		Year.	Highest.	Lowest.	Year.	Highest.	Lowest.	
Delhi	Delhi	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	
	Gurgaon	1838	3 2 0	2 6 0	1878	3 0 0	2 0 0	
	Karnal	1849	3 3 3	1 8 0	1878	3 0 0	1 8 0	
Hissar	Hissar	No such rates.	—	—	1864	0 10 0	0 8 0	
	Rohtak	—	—	—	1878	3 0 0	2 12 0	
Umballa	Sirsa	1856	0 13 0	0 13 0	—	—	—	
	Umballa	Not stated.	—	—	—	—	—	
	Ludhiána	Cannot be given.	—	—	—	—	—	
Jullundur	Simla	—	—	—	—	—	—	
	Jullundur	Cannot be stated.	—	—	—	—	—	
	Hoshiárpur	—	—	—	—	—	—	
Amritsar	Kangra	No rates framed.	—	—	—	—	—	
	Amritsar	1854	3 4 0	1 8 3	1865	Not reported.	—	
	Siálkot	1854-59	2 4 0	0 8 0	1865	Not reported.	—	
	Gurdáspur	1854	4 1 3	2 1 2	1865	Not reported.	—	
Lahore	Lahore	1854	1 2 0	0 9 0	1868	1 0 0	1 0 0	
	Ferozepore	1856	0 14 0	0 14 0	1872	0 13 0	0 6 0	
		(Muktsar and Mamdot only.)	—	—	—	—	—	
	Gujránwála	1854	1 8 0	1 0 0	1866	1 8 0	1 4 0	

CHAP. I.QN. 13. (B.)—SUMMARY of REVENUE RATES assessed on SAILAB LANDS, *i.e.*, MOIST ALLUVIAL LANDS in the VICINITY of or ANNUALLY INUNDATED by RIVERS—*cont.*

PUNJAB.		Major Wab.			SETTLEMENTS MADE BEFORE 1862.			SETTLEMENTS MADE SINCE 1862.			Remarks.
DIVISION.	District.	Year.	Highest.	Lowest.	Year.	Highest.	Lowest.				
Rawalpindi	Rawalpindi	1864	Rs. A. P.	Rs. A. P.	—	Rs. A. P.	Rs. A. P.	—			
	Jhelum	1857	3 8 0	0 4 0	1878	1 8 0	1 4 0				
Mooltan	Gujrat	1858	2 0 0	0 14 0	1868	2 0 0	0 14 0	—			
	Shahpur	1854-66	1 12 0	1 4 0	—	—	—				
Mooltan	Mooltan	1855	1 2 0	0 4 0	1878	1 4 0	0 12 0	—			
	Jhang	1856	1 8 0	0 10 0	1878	1 0 0	0 8 0				
Derajat	Montgomery	1856	1 6 0	0 12 0	1873	Not stated.		—			
	Muzaffargarh	—	—	—	1878	1 2 0	0 12 0				
Derajat	Dera Ismail Khan	—	—	—	1878	1 6 0	0 11 0	—			
	Dera Ghazi Khan	—	—	—	1874	0 15 2	0 5 0				
Peshawar	Bannu	—	—	—	Not stated separately.			—			
	Peshawar	—	—	—	1876	2 0 0	0 12 0				
Peshawar	Kohat	—	—	—	1878	0 12 0	0 8 0	—			
	Hazará	—	Not stated separately.								

(C.)—SUMMARY of the REVENUE RATES assessed on ORDINARY DRY LANDS, *i.e.*, LANDS entirely dependent on RAIN.

[Rates per acre.]

Division.	District.	SETTLEMENTS MADE BEFORE 1862.			SETTLEMENTS MADE SINCE 1862.			Remarks.
		Year.	Highest.	Lowest.	Year.	Highest.	Lowest.	
Delhi	Delhi	—	Rs. A. P. 1 10 0	Rs. A. P. 0 12 0	1878	Rs. A. P. 1 12 0	Rs. A. P. 0 10 0	
	Gurgaon	1849	2 0 0	0 7 0	1878	1 8 0	0 9 0	
	Karnal	1847	1 8 0	0 8 0	1878	1 8 0	0 8 0	
	Hissar	1864	0 6 0	0 3 0	—	—	—	
Hissar	Robtak	—	—	—	1878	1 6 0	0 6 0	
	Sirsa	1856	0 4 0	0 3 0	—	—	—	
Umballa	Umballa	1855	3 10 0	0 7 0	—	—	—	
	Ludhiána	—	—	—	Cannot be given.			
Jullundur	Simla	—	—	—	Ditto.			
	Jullundur	1851	3 0 0	1 0 0	—	—	—	
	Hoshiárpur	1851	3 4 0	0 4 0	—	—	—	
	Kángra	—	—	—	No rates framed.			
Amritsar	Amritsar	1854	2 6 2	0 7 5	1865	Not reported.		
	Sialkót	1854-59	2 10 0	0 8 0	1865	Ditto.		
	Gurdáspur	1864	2 11 6	0 14 0	1865	Ditto.		
	Lahore	Lahore	1854	1 0 0	0 3 0	1868	1 0 0	0 5 0
Lahore	Ferozepore	1856	0 9 0	0 6 0	1872	0 13 0	0 6 0	
	Gujránwála	1854	1 0 0	0 4 0	1866	0 14 0	0 7 0	
	Rawalpindi	1864	3 8 0	0 8 0	—	—	—	
	Rawalpindi	1857	2 1 0	0 6 0	1878	2 8 0	0 6 0	
Rawalpindi	Jhelum	1858	1 8 0	0 6 0	1868	1 8 0	0 6 0	
	Gujrát	—	—	—	—	—	—	
	Shahpur	1854-66	0 8 0	0 8 0	—	—	—	
	Mooltan	1855-59	0 4 0	0 4 0	1878	0 4 0	0 4 0	
Mooltan	Mooltan	1856	0 8 0	0 8 0	1878	0 8 0	0 8 0	
	Jhang	1856	0 10 0	0 6 0	1873	0 13 0	0 6 0	
	Montgomery	—	—	—	—	—	—	
	Muzáffargarh	—	No Báráni cultivation possible, owing to scant rain-fall.					
Derajat	Dera Ismail Khan	—	—	—	—	0 8 0	0 1 0	
	Dera Gházi Khan	—	—	—	—	0 6 1	0 1 0	
	Bannu	—	—	—	—	2 0 0	0 1 0	
	Peshawar	—	—	—	—	0 12 0	0 2 6	
Peshawar	Pesháwar	—	—	—	—	0 6 0	0 3 0	
	Kohát	—	—	—	—	—	—	
	Hazára	1861-62	2 0 0	0 8 0	1872	4 0 0	0 2 0	

Is the incidence on the various classes of land fairly distributed, or would you propose any re-adjustment of it?

The incidence of the revenue on the various classes of land is fairly distributed. The land revenue system of the province provides material securities for this. The settlement of each district being made for 20 or 30 years, as described in reply to the next clause of this question, at the expiration of that term

the district comes under re-settlement. The Settlement Officer is required to report in detail the new assessment which he proposes to impose. A separate report is required for each tahsil. To this end he estimates the value of the gross produce, and the share thereof to which Government is customarily entitled in each tract composing the tahsil under report; he then explains the proportion of this which each soil ought to contribute, stating the result in the form of average rates on each main class of soils. In doing

this he is expected to show that he has observed a just mean between an over minute and arbitrary classification of soil on the one hand, and on the other hand a classification so broad as not to neglect substantial diversities of fertility, natural or artificial, locally recognized by the owners in their dealings with each other, or with their tenants. It is necessary to pay attention to this subject, because the assessment of each tahsil being first estimated in the lump, the power of distributing it justly over each village depends on a just appraisal of the relative value of the principal soils. The proportion of different soils held by each village is never the same. The Settlement Officer's preliminary report having been approved by the Financial Commissioner, the next step is to divide the gross assessment sanctioned for the tahsil, or for each principal tract contained therein, over the villages of which it is made up. This is done by applying to the areas of each village the average rates which the Financial Commissioner has sanctioned. The Settlement Officer, however, is not required to apply the rates blindly, but to consider how far the circumstances of each village agree with the average condition of the tract. If the soils or any one soil of a village is better or worse than the average of the tract, or if there are any other circumstances affecting the prosperity or productiveness of the village and its rent-paying power, he is required to adjust the assessment correspondingly thereto. Having thus assessed each village, he again reports the result. This report is in the form of a tabular statement; in this statement each village is entered separately; and in cases in which the assessment proposed for a village differs from that indicated by the general rates before sanctioned, the Settlement Officer is required to record his reasons for the divergence. These proposals being sanctioned, each village is informed of the total sum assessed on it. At this point a new check comes into play for insuring the fair distribution of the revenue. The Settlement Officer cannot dictate to a village the manner in which it should divide the assessment over the holdings of which it is composed, nor impose on the owners his own average rates as their guide in the division of the assessment among themselves; he can, and does, no doubt, influence them materially; but this influence could not be successfully extended to the forcing on them of arbitrary or unfair relative assessment of soils. The form of the assessment will, in some cases, decide the question partially; and this occurs usually in the assessment of canal irrigated villages, where so much of the assessment as is due to irrigation profits is levied by fixed rates on the various descriptions on crops cultivated each year; the amount assessed in each year thus depending partly on the extent of irrigation and the manner in which it is applied. Omitting this and a few other similar instances, the manner in which the gross assessment of a village shall be divided over the holdings is decided by the village owners themselves. In the great majority of cases, especially where the gross assessment has been fairly made, the village owners succeed in doing this amicably. They are practical agriculturists; they have been paying similar assessments for years past; and if in Sikh rule they paid the revenue by a share of the produce, that share usually varied according to the value of the main soils. Moreover, if a Settlement Officer commands the confidence of the people among whom he is employed, the owners of most villages as a matter of fact will not attempt to overreach each other in matters of this sort. Of course in a certain number of cases disputes do arise, though they are rarely very complicated or difficult. When a complaint is filed before the Settlement Officer (the jurisdiction of the civil courts in such matters is barred), it is heard as a revenue case, and there is an appeal from the decision to the controlling revenue authorities. The complaint may be, that the method of distributing the revenue, which the other side desire to enforce, is opposed to the tenure on which

the village is held; as where a village is owned on shares, and it is attempted to distribute the revenue on a different principle, or on different shares than the shares of ownership;—or where the village is not owned on shares, the petitioner may complain that the relative value of the soils has been unfairly appraised, or that his own fields have been wrongly classed. The principal basis of decision in these cases is the past practice of the village concerned, and the common practice of adjacent villages similarly situated. No doubt such practice is not an infallible guide; and no doubt also there is a steady action in our settlement whereby inequalities previously existing are corrected under the influence of the views held by the settlement authorities. But we have never attempted to introduce any arbitrary soil classification of our own, and have mainly confined our action to assisting the people to settle such questions voluntarily among themselves; and when they have failed to do so, we have decided such disputes, as far as possible, on the lines already laid down by the agricultural practice of the neighbourhood.

In short, while it is believed on the one hand that the incidence of the revenue on the various classes of soils is fairly distributed, being based on distinctions locally recognized, and on the voluntary action of the land-owners in dividing the gross assessment of each village over their holdings; on the other hand no attempt has been made to make the existing distribution permanent. As the revenue leases of each district expire, and a new settlement is made, the existing system of assessment compels the revenue authorities to reconsider the matter thoroughly; and independently of this action, the landowners have it in their own power on such occasions, either to maintain the former distribution, or to remedy any inequalities which they may consider to exist—a power with which the revenue authorities will not interfere, except upon proof by dissentients that the former system or proposed innovations are inequitable.

When was the assessment fixed?—The whole of the Delhi division, with one exception, has been under re-settlement since 1872, when the assessments (made 30 years before) expired. The exception is a portion of the Karnal district of which the existing leases will expire in 1880, having been made 30 years previously.

In the Hissar division the Rohtak district has been under re-settlement since 1873, its previous 30-year lease having then expired. The Hissar district was settled on a 20-year lease in 1863, and the Sirsa district at various dates about 20 years ago, which expired in 1876. The Sirsa District is about to be placed under re-settlement.

In the Umballa division the existing assessments were nearly all made about 30 years ago. The Ludhiana district has been placed under re-settlement, and the Umballa district will shortly be so treated; the leases in both districts having expired or being on the eve of expiring.

The Jullundur division is in the same position as the Umballa division.

The Amritsar and Lahore divisions, except the Ferozepore district, were settled from 10 to 13 years ago on 20 year leases, which will expire between 1885 and 1888. The greater part of the Ferozepore district was settled on a 30 year lease 24 years ago; the assessment will expire in 1884; and that of the rest of the district, settled later, in 1892.

In the Rawalpindi division, the district of that name and the Shahpur district were settled 20 years ago, and the Gujrat district 10 years ago. The leases of these three districts run for 20 years from completion of the assessment, expiring respectively in 1880, 1881, and 1888. The Jhelum district's leases expired in 1874, and the district has since been under re-assessment.

In the Mooltan division the Montgomery district was settled on a 20 year lease about 1870-73. The rest of the division has been under re-settlement for the last five years.

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In the Derajat division the district of Dera Ghazi Khan was assessed on a 20 year lease in 1873. The rest of the divisions also has lately been re-assessed, the operations being just completed.

In the Peshawar division the Kohat district is under settlement; the Peshawar district has a 20-year lease, and the Hazara district a 30-year lease, dating from 1874.*

It is necessary to explain the principle on which the dates and duration of each district lease is fixed. It is the fixed policy of Government to give usually leases of 30 years' duration, but for sufficient reason the term is restricted to 20 years or even a shorter period. Such reason may be that the assessment is apparently inadequate, and that important changes, such as the extension of canal irrigation, are impending.

In the next place, it has lately been decided to restrict the number of districts under settlement at one and the same time. It has been found by experience very embarrassing to subject a large number of districts to settlement operations simultaneously; the revenue establishments in all grades become abnormally enlarged; the difficulty of supervising extensive assessment operations is very great; and if important issues are raised, they are presented in a form affecting such large areas that their decision involves great responsibility and very wide-spread results. Moreover, after a few years of these extensive operations no more districts remain to be re-settled; and the Government is consequently compelled to dismiss valuable establishments, and to absorb the covenanted Settlement Officers in the regular line of administration. Subsequently, a few years later, when the leases of other districts have fallen in, these establishments have to be formed anew with great difficulty, and much of the experience before gained has been lost by the hiatus which has occurred in the operations. Under the system lately adopted, by only undertaking the re-settlement of a small number of districts at a time, these evils are avoided. The re-settlement of a district ordinarily takes from four to five years; it follows that six districts can be settled in 30 years; and therefore that with five settlement establishments working in the Punjab,† all the leases would have been revised in the same period; and the leases of those first settled would have by that time expired; so that the five settlement establishments will have continuous employment. The number of settlement establishments is at present in excess of five, but will shortly be reduced to that number. The application of a system of this sort no doubt needs some care, to prevent loss of revenue to Government during its introduction; but it has been ascertained that there are no insuperable, or even very serious, difficulties of this nature; and the system admits of some elasticity of application, as it would be comparatively easy to increase five settlement establishments on occasion to six, or to reduce them temporarily to four. But perhaps the value of the system to the people of the province is even greater than its value to Government, for it ensures that the establishments employed on settlement work shall be carefully trained, and possess steadily accumulating experience; and also that the controlling authorities shall have leisure to consider fully the important issues raised in the course of their operations.

Has there been any practical difficulty in realizing the land revenue as now assessed? At what dates are the instalments of revenue payable, and what relation do these bear to the ordinary periods of

* In the foregoing remarks I have abbreviated details as much as possible; the object, I presume, being rather to give a summary of the subject than unimportant details concerning each district. The dates are taken from statement 23 appended to the Annual Revenue Report for 1876-77, the last issued.

† The number of districts is 32; of which one, Simla, is very small.

harvest or of realization of rents, as the case may be? Do the several instalments bear a fair proportion to the value of the several harvests from which the revenue or rent has to be made good? What rate of interest, if any, is charged on land revenue in arrear?

The land revenue has been realised with ease in the whole province for years past. In the few years immediately following annexation (A. D. 1849), our assessments were necessarily based on the heavier collections of Sikh rule; we had little knowledge of the country at our command; the prices of grain were much depressed, and the peaceful influences of our rule had scarcely begun to tell on the community at large. Under such circumstances it was not to be expected that the land revenue would always be realised with ease. But from the first the use of the severer measures of coercion known to the Land Revenue Law of India was discountenanced. Attempts to sell, transfer, or farm the lands of defaulters were avoided wherever possible; in fact, almost entirely. This action was partly based on a sense of the great difficulties involved in the consolidation of our rule in those earliest days of the Punjab administration; and partly prompted by the personal experience of the principal civil officers first entrusted with its Government, officers who had seen with their own eyes in our older provinces the evil wrought by the use of severe measures to realise a revenue evidently paid with difficulty. We knew that, if we would secure the prosperity and contentment of the country, we could not expect to realise a revenue pitched at the same heavy incidence as that levied by the Sikh rulers. We also knew that the mere striking off a per-centage of what our predecessors had levied was in all cases a very rough measure of relief, and in not a few cases probably an insufficient one. Any attempt to realise balances with severity was consequently avoided from the first. New settlements of a complete or summary character were rapidly pushed on, and the growth of the cultivated area gave whatever additional relief was required. It followed that ten years after the Punjab was annexed the difficulties of over-assessment which the Sikh Government had bequeathed to us had disappeared; higher prices set in; and from that time to the present the cases of difficulty in realising the assessment have been few and exceptional.* Further information on the subject is given in the reply to question 14.

As regards the instalments in which the land revenue demand is paid, over the greater part of the province, they are four in number, payable at the following dates:—

RABI	1st Instalment	15th June.
	2nd Instalment	15th July.
KHARIF	1st Instalment	1st December.
	2nd Instalment	1st February.

There are local differences of practice, which have been allowed to suit specialities of season and crop; but no object would be served by detailing minor differences of this nature. The principle on which the above instalments were fixed, and variations from them are allowed, is that the agriculturists should be allowed full time for harvesting their crops, and landowners for collecting their rents, before they are required to pay the revenue demand. If the reply to question 5 be referred to, it will be seen that the harvesting of the Rabi crop is completed by May, and that of the Kharif by November (except sugar-cane, which is later); so that the above dates for paying the revenue amply meet the principle on which they were fixed. There is indeed in the Financial Commissioner's opinion reason to fear that the liberality of Government in thus delaying its demand has in some cases been carried too far. The Patwari (revenue accountant) of each village is bound to have ready a month

* The total number of warrants issued for revenue over-due in the year 1876-77 was 47,850; and only in 142 cases was it necessary to enforce them by prisoner imprisonment, and in 217 cases by distraint of chattels.

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before the revenue of each harvest falls due a statement showing the demand payable by each owner.

As regards the proportion that each instalment bears to the value of the harvest for which it is paid, there is no reason to suppose that it is otherwise than fair. These proportions were originally established at a time when much of the revenue was levied in kind, or if levied in cash was assessed at each harvest by appraisalment of the standing crop; and they were presumably based on the accounts of what was actually levied under such systems. The agriculturists, moreover, do not view with favour innovations in matters of this kind until a substantial necessity arises for them, or unless the changes to be introduced carry with them some obvious advantage.

Both this subject and also that of the dates and number of instalments are open to re-adjustment at each settlement of a district; and any changes which are desired, or for which a substantial reason can be shown, are then sanctioned by the Local Government. Several proposals of this nature have been sanctioned in the late settlement of the Mooltan, Derajat, and Peshawar divisions.

The following table shows the proportion of the land revenue of each division paid at each harvest, and roughly the manner in which that compares with the produce of each harvest:—

Division.	Per-centage of the annual demand paid.		Of the average annual area cultivated with crops, what per-centage is cultivated with		REMARKS.
	At the Rabi harvest.	At the Kharif harvest.	Rabi crops.	Kharif crops.	
Delhi	51	49	40	60	The last two columns only show the area of the crops of each harvest. It would not be possible to show the value without entering into a complicated calculation.
Hissar	35	65	21	79	
Umballa	47	53	55	45	
Jullundur	43	57	55	45	
Amritsar	50	50	61	39	
Lahore	55	45	58	42	
Rawalpindi	54	46	59	41	
Mooltan	57	43	69	31	
Derejat	58	42	69	31	
Peshawar	41	49	63	37	
Total	49	51	51	49	

It should be added that so much of the land revenue as may be assumed to be contributed by grazing and milch produce is by the old customs of the country a kharif demand. It is only in autumn that the grasses of the hills and waste plains attain any nutritious growth, and the dues levied by owners on cattle grazing are very generally known by the name of *sawani*, or the dues of *sawani* (15th July to 15th August), the month when the grass grows. The richer crops, sugar-cane, rice, cotton, indigo, &c., also belong to the kharif season.

No interest is charged on land revenue in arrears.

NOTE by MR. T. H. THORNTON on an Article by MR. HYNDMAN in the "Nineteenth Century," entitled the "Bankruptcy of India," considered with reference to the Province of the Punjab.

Mr. Thornton.

I. A full and complete criticism of Mr. Hyndman's paper must necessarily be a work of time and of more minds than one, for it involves acquaintance—and more than superficial acquaintance—with the state and circumstances of a population of 200,000,000, a population divided into races widely differing from each other in habits and in language, spread over an area 12 times the size of the United Kingdom, and living under distinct physical and administrative conditions. But, meanwhile, an examination of his statements, as applied to one out of the nine provinces of British India, will not, perhaps, be valueless.

If his conclusions are shown, so far as that province is concerned, to be erroneous, this, of itself, will be a point gained; the area of alleged insolvency will be sensibly contracted and an instalment of relief afforded to the public creditor, while, should the process of investigation reveal, as I believe it will reveal, errors or misconceptions affecting the principles of Mr. Hyndman's calculation, fair ground will be given for questioning the correctness of his conclusions generally. I propose then to examine Mr. Hyndman's statements with special reference to the province of the Punjab, a province with an area larger than Great Britain, and a population—allowing for increase since the census of 1863—of 20,000,000 souls. I select this province simply because it is the part of India in which I have been employed for many years, and I propose on this occasion to restrict my inquiry to its agricultural population of 11,000,000, leaving the non-agricultural population to be dealt with, if necessary, in a future paper.

Before proceeding further, let me briefly recapitulate the main points of Mr. Hyndman's arguments. The annual value of the agricultural produce of British India, Mr. Hyndman says, is 300,000,000*l.* This sum divided amongst a population of 190,000,000, gives an average yearly income per head of 3*l.* 6*d.* But, judging from the cost of dieting a prisoner in the Bengal gaoles, viz., Rs. 28 or 2*l.* 16*s.* per annum, the cost of food alone (irrespective of clothing, repairs, feed of bullocks and other contingencies) must amount, all round, to Rs. 23, or 46*s.* per head of population.

Ergo, the people have not the means sufficient to procure even the necessities of life. Furthermore, supposing the produce to be divided, not amongst the entire population, but amongst the agricultural population only, still, as this population comprises 150,000,000 out of the 190,000,000, the same result will be obtained, namely, that the mass of the people have not the wherewithal to support a healthy existence. In these circumstances, the taxation (Imperial and local), though falling at the low rate of 5*s.* per head, is crushing; India is becoming more and more impoverished, whilst the soil, ill-farmed and over-cropped to meet immediate necessities, is year by year deteriorating.

The first criticism suggested by these statements is one of a somewhat fundamental character, but it will be endorsed, if I mistake not, by all who are familiar with the circumstances of peasant life in India; it is that Mr. Hyndman's method of gauging the financial condition of the agriculturist is an exceedingly fallacious one. It proceeds upon the supposition—a very natural one for Englishmen, but not the less erroneous—that the Indian peasant, like the English farmer, sells all his produce and buys all his supplies. Fortunately or otherwise for himself, but unfortunately for statist, the Indian peasant, as a rule, pursues a different course. He retains so much of his produce as he requires for seed and home consumption and disposes of the surplus only; and this surplus he does not ordinarily sell in open market, but makes over to the village *banyan* with whom he has an account current for cash advanced and goods supplied. To attempt to give a money value to these primitive transactions and formulate the financial condition of the peasantry in terms of cash receipts and payments must be, under such circumstances, a very hazardous undertaking. To do so, without local knowledge, is certain to result in error.

But the method, bad or good, has been used by Mr. Hyndman, and used, indeed, with startling effect. It will be well, therefore,—in the first instance, at all events—to follow the method he has employed, but test, with the aid of local knowledge, the correctness of his calculations.

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Let us therefore examine Mr. Hyndman's statements with special reference to the agricultural population of the land of the Five Rivers.

In other words, let us estimate, so far as circumstances permit, the receipts and expenditure of the Punjab peasantry, inquire into the distribution of their profits and the pressure of their taxation, and see how far the situation corresponds with the gloomy picture given in the preceding paragraph.

II.

What then, are the annual receipts of the Punjab agriculturists?

They are estimated by Mr. Hyndman at 33,800,000*l.*

Crop.	Average Area under Crop in Acres.	Average Produce in Lbs.	Value, at average Market Rates, in £.	REMARKS.
Wheat - - - - -	6,000,000	5,280,000,000	13,200,000	I have taken the average produce per acre of wheat at 880 lbs.; barley at 1,040 lbs.; maize and millets from 425 to 610 lbs.; pulses at 400 lbs. all round; rice at 850 lbs.; oil-seeds at 420 lbs.; cotton (cleaned) at 100 lbs.; in accordance with the opinion of the Financial Commissioner based upon a series of experiments and returns of average yield obtained from all classes of soil in all parts of the province. Where the returns of average yield are less reliable, I have based the estimate of value chiefly on the selling price of the standing crop. Thus sugar-cane and poppy have been valued at 5 <i>l.</i> an acre, condiments and vegetables at 4 <i>l.</i> , tobacco and indigo at 3 <i>l.</i> The market values have been calculated on the average of seven years ending in 1877-78.
Barley, Maize, and Millets	7,500,000	4,900,000,000	8,900,000	
Pulses - - - - -	3,300,000	1,320,000,000	3,000,000	
Condiments, Pepper, Turmeric, Coriander, &c. - - -	200,000	100,000,000	800,000	
Rice - - - - -	735,000	624,000,000	3,400,000	
Vegetables - - - - -	200,000	1,200,000,000	800,000	
Oil-seeds - - - - -	720,000	300,000,000	1,000,000	
Cotton - - - - -	630,000	63,000,000	1,000,000	
Sugar-cane - - - - -	374,000	600,000,000	1,800,000	
Tobacco - - - - -	74,000	74,000,000	200,000	
Indigo - - - - -	100,000	4,000,000	300,000	
Poppy (heads, opium, and seed)	12,500	8,400,000	60,000	
Miscellaneous crops of food grains, fibres, dyes, fruits, &c., &c. - - - - -	804,500	-	1,540,000	
Total -	21,000,000	-	£36,000,000	
	The area given above does not include fallows amounting to 4,000,000 acres, more or less.	Deduct for seed	2,200,000	
		Balance - -	£33,800,000	

But here we encounter the first of Mr. Hyndman's "misconceptions." A statement of the annual value of the harvests, however accurately estimated, is not an exhaustive account, or anything like an exhaustive account, of the receipts of agriculturists. Such statement, besides leaving out of view a multitude of minor sources of profit, such as receipts from sale of straw and other fodder, the produce, other than fruit, of cultivated trees and shrubs,* and the gain, sometimes considerable, from the sale of fish, eggs, and poultry, takes no cognizance of three important items of a peasant's income, viz., the proceeds of *dairy*, *stock*, and *forest* produce.†

In the case of the province with which we are at present concerned, two out of the above three items, viz., *dairy* and *stock* produce, are specially remunerative; for, while the local demand for them is more

sterling, a result arrived at by taking the area under cultivation at 20,957,735 acres, or, in round numbers, 21,000,000 acres, the yearly value of the produce at 36,000,000*l.*, and deducting from the latter the sum of 2,200,000*l.*, as representing the value of seed grain.

In the above calculation the statement of area cultivated and the value of its produce may be accepted as approximately correct. It is taken, in fact, directly, or indirectly, from the report of the Punjab census of 1868 and the statistical returns published annually by the Punjab Government; some further details, derived from the same source, are given in the subjoined table:—

than ordinarily great, the opportunities for production are exceptionally favourable. The local demand is more than ordinarily great, because the bulk of the population are (for India) large consumers of flesh, milk, and ghee, and require, for at least six months in the year, protection against the cold in the shape of blanketing and woollen wrappers. The opportunities for production are exceptionally favourable by reason of the large extent of land available for pasture. Many of the Punjab villages, especially in districts west of the river Satlaj, and south of the Salt Range, possess, in addition to the ordinary fallows, large areas of waste; while in the *Doabs* or stretches of low jungle between the beds of the large rivers, there are millions of acres of grazing land, the property of the State, where large numbers of buffalo, cattle, sheep, and goats are pastured on payment of a small fee.

With regard to *forest* or *jungle* produce, leaving out of view income derived from such items as barilla,* saltpetre, gum, lac, bamboos, catechu,† tamarisk galls,‡ dhak leaves,§ manna, wild honey, fruits|| and fibres;¶ no small returns are derived from the sale of two of the prime necessities of life—timber and firewood. The former source of profit is confined chiefly to villages of sub-montane, or hill districts, where the country is well wooded, but many village communities in the plains have, in their waste or jungle lands, large supplies of fuel, which they dispose of to the non-agricultural population at an average rate of 1*s.* per cwt.

* Made from the ashes of wild-growing *salsolas*, known locally as *lahna*.

† The coagulated extract from the *Acacia catechu*—the *Terra japonica* of commerce.

‡ Used in tanning and dyeing.

§ The leaves of the dhak (*Butea frondosa*) yield a yellow dye, and its bark is used for ropes.

|| e.g. the fruit of the pilu (*Salvadora oleoides*), the wild caper, the jhand (*Prosopis spiciqera*), and the wild plum largely consumed as food by the poor.

¶ Especially the grass known as munj (*Saccharum munja*) much used for well ropes, thatching, and furniture.

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No complete returns of either dairy, stock, or forest produce are available, and I cannot myself pretend to any practical acquaintance with farming or with forestry, but, with the help of official statistics and the information afforded by English and native experts, I venture, at the risk of being extremely tedious, to give the following rough estimates of the amount and value of these sources of income:—

(1). *Milk and its products*.—Of the milk of cows and buffaloes produced in the Punjab, the greater portion, say three-fourths, is converted into ghee, the butter-milk resulting from the process being retained, for the most part, by the peasantry for home consumption; of the remainder, some is consumed *au naturel*, and the rest in the form of curds, and occasionally cheese.* For estimating the value of this produce the following data are available:—

(a.) From the Punjab stock returns (which are believed, if anything, to understate the truth) it would appear that the number of milch cows and buffaloes in the Punjab cannot be less than 1,500,000, capable of yielding milk, ghee, and curds to the value of at least 4,000,000*l.* annually;

(b.) The amount of ghee allowed to adult prisoners in gaol, i.e., the minimum considered sufficient for the maintenance of health, is 5 lbs. per head per annum;

(c.) The amount imported into towns (as shown in the octroi returns) gives an average annual consumption of 8 lbs. a head; but this does not include the ghee produced within octroi limits, the amount of which must be considerable;

(d.) The estimate of consumption of ghee in towns, made for the purpose of regulating octroi taxation, gives an average of 9 lbs. per head per annum.

Upon the whole we shall probably be not far wrong if we take 8 lbs. a head as the average yearly consumption of this item of dairy produce. On this assumption the value of ghee annually consumed by the Punjab population of 20,000,000 will amount (at 4 lbs. of ghee per rupee) to 4,000,000*l.*; but in calculating the value of the Punjab produce, the net value of imported ghee, viz., 800,000*l.*, must be deducted, leaving 3,200,000*l.* as the value of the local produce. Taking one-fourth of this amount, or 800,000*l.*, to represent the value of unconverted milk, curds, and cheese, the total value of the dairy produce consumed or sold in the Punjab may be estimated at 4,000,000*l.* yearly.

(2). *Wool and Hair*.—Wool, the produce of the plains, is used in the manufacture of coarse blankets, rugs, and felt; the superior wool of the hill tracts of Kangra, Hazara, and the Salt Range, is woven into a broadcloth known locally as *pattu*, and into *lois*, or woollen wrappers. The soft hair of the camel furnishes material for *chogas* or outer vests, and that of goats is used locally for ropes, matting, and grain bags. Assuming each family of five to purchase but one new blanket annually, the yearly supply of coarse wool required for the mass of the population will amount, at 6 lbs. of wool per blanket, to 24,000,000 lbs. representing, at 3*d.* a lb., a money value of 300,000*l.* Adding to this amount 300,000*l.* as the value of the superior wool of the hill tracts, and of goats and camels' hair, and the sum of 200,000*l.* as the average value of our exports, we may estimate the total annual value of the wool produce of the Punjab at not less than 800,000*l.*

(3). *Hides and Skins*.—The hide of cows and bullocks is used for the upper leather of common shoes, for saddlery, harness, and accoutrements, for flour bags (*khallars*), and in some districts is made into flasks, hookah bowls, and other household utensils. That of the buffalo is used chiefly for shoe soles and for the leather thong connecting the yoke with the plough; that of the camel for large scale dishes and *huppas*, or receptacles for oil. Sheep and goat skins are used for the upper leathers of superior kinds

* Cheese is also made from the milk of ewes and goats, but is not an article of general consumption, except, perhaps, among the Patan races of the north-west frontier.

of shoes, shoe linings, bookbinding, and water bags, and, in hill districts, are made into a kind of wash-leather used as an article of clothing, and into soft red leather known locally as *lahhi*. *Posteens*, or outer coats of sheepskin, are much used for winter wear on the north-western frontier. The leather manufactures of the province are inferior, but the local consumption is large, and the export not inconsiderable; shoes go in large numbers eastward, and the soft red leather of Nurpur and otter skins find a market in the north. The export of the raw material has been increasing greatly of late years and is now equal to nearly a third of the hide exports of Calcutta. The market value of the raw hides annually required for the manufacture of common shoes is estimated by experts at 400,000*l.* and of that used for the other purposes above enumerated may be taken roughly at 200,000*l.* The value of hides exported (as shown in the Punjab trade returns) averages 150,000*l.**, and that of the raw material of leather exports may be taken at 50,000*l.* Altogether 800,000*l.* will not be an excessive estimate of this item of produce.

(4). *Meat*.—(a.) Assuming the adult population of the Punjab to consume meat to the extent it is allowed to prisoners in gaol, the value of the meat required for the province will amount, at 2*d.* a lb., to 3,300,000*l.* annually.

(b.) Assuming the population generally to consume meat to the extent to which the octroi returns and estimates show it to be consumed in towns, the annual value of the meat consumed in the Punjab will be 2,500,000*l.*, without taking into account the value of the better class of meat largely consumed by the troops† and English residents of the province. To be on the safe side we will take the smaller sum, 2,500,000*l.* per annum, as the value of the Punjab meat supply.‡

(5). *Animals sold for Draught or Dairy purposes*.—Of the value of animals thus disposed of annually it is impossible to form an estimate approaching accuracy; but the receipts under this head must be considerable. The number of cattle required yearly to replenish the stock employed in cultivation cannot be less than 500,000, and their value, at the lowest market rates, will amount to 1,000,000*l.* sterling;§ the number of milch cows and buffaloes being, as we have seen, about 1,500,000, the number required annually to keep up the stock cannot be less than 150,000, representing a money value of at least 300,000*l.* Then large numbers of buffaloes and bullocks are purchased from agriculturists for transport of grain and other merchandise, for turning mills and other purposes of draught not connected with agricultural operations. Altogether the value of cows, bullocks, and buffaloes annually sold by agriculturists may be safely estimated at not less than 1,500,000*l.*

Of receipts from the sale of sheep and goats (otherwise than for slaughter), poultry and game, I will not hazard a conjecture.

(6). *Timber and Fuel*.—Of the value of timber sold by villagers, it is impossible to make more than a very rough calculation.

The last octroi returns show an importation into

* According to the returns for 1877-78 just received, the value of hides exported in that year was 440,000*l.*

† The meat rations of the British troops in the Punjab, procured on very favourable terms, cost the Government upwards of 40,000*l.* per annum, or about 2*l.* 10*s.* per soldier.

‡ An amount sufficient to furnish the adult population with a little more than 1 lb. of meat a fortnight per head.

§ According to the latest return of cultivation, the area prepared for the spring crop exceeded 12,000,000 acres, requiring, for ploughing and irrigation, at 5 acres per yoke in well lands and 7 acres per yoke in the remainder, upwards of 4,000,000 cattle. Taking 4,000,000 as the number of cattle employed, and assuming each animal to last on an average 8 years, the yearly supply required will be 500,000. As to value, according to the latest yearly returns, the price of plough bullocks in the Punjab ranged from 2*l.* to 5*l.* 10*s.* each, the average being 3*l.* 12*s.* I have assumed the average price to be the lowest of these quotations,—viz., 2*l.*

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In regard to fuel it may be observed that the fuel consumed in cooking prisoners' food amounts to 266 lbs. per head per annum, costing at market rates 2s. 4½d. per prisoner. At this rate the value of the fuel used for cooking purposes by the non-agricultural population (I assume the agricultural population to obtain their fuel *gratis*) would exceed one million sterling annually; but the cooking of prisoners' food being done on a large scale requires a minimum of fuel; the amount allowed a sepoy for the same purpose is exactly four times as large; taking a mean between these two extremes, and reckoning the amount of fuel required per head of non-agricultural population for cooking and other domestic purposes at half the amount supplied to sepoys for cooking only, we shall probably be well within the mark. On this assumption the value of fuel supplied annually to the non-agricultural population for household purposes will amount, at market rates, to 2,000,000L.; but this amount does not include the value of fuel supplied for locomotives, steamers, manufactures, and other non-domestic purposes, which must amount to, at least, 300,000L. more.

According to the above estimates, the aggregate value of the dairy, stock, and forest produce of the province must amount on the average to at least 13,000,000L. This raises the value of the annual produce of the Punjab from 33,800,000L. the amount estimated by Mr. Hyndman, to 46,800,000L.

But in estimating the value of this produce to the agriculturist some deduction must be made from its market value on account of cost of carriage, and the profits of the grain dealer or salesman. Allowing a deduction on these accounts of 10 per cent., the average money value of the Punjab produce to its producers, in other words, the receipts of the agricultural population, will amount to 42,120,000L., or in round numbers, 42,000,000L. annually, giving an average income per head of about 76s. instead of 40s. as estimated by Mr. Hyndman.

III.

Having dealt with the receipts, let us proceed to the second stage of our inquiry, and endeavour to estimate the expenditure of the Punjab peasantry.

The subject may be conveniently considered under the following heads:—Cost of food, clothing, repairs and miscellaneous household expenses; cost of seed grain, labour, feed of cattle, replenishment of stock, repair and renewal of agricultural implements, keeping well gear in order, manure and other farming contingencies.

Of the above-enumerated items, Mr. Hyndman has furnished an estimate of one only,—the cost of food. His estimate in this case is based on the annual charge per head for feeding prisoners. Finding this charge to amount in Bengal, gaols to Rs. 28, or 56s. per head, he has taken it to represent the yearly cost of the food of an adult, and, allowing a small reduction for children, assumes an average rate of Rs. 23, or 46s. per head per annum, as a fair estimate of the cost of living by the population generally on the Government standard.

Here we are introduced to more of Mr. Hyndman's "misconceptions." Objection might indeed be fairly taken to the adoption, under any circumstances, of Indian gaol dietary as the standard of healthy and sufficient food; for, applying, as it does, to persons subjected to labour, frequently harder and certainly more continuous than in ordinary life, and suffering from the depression resulting from confinement, it is notoriously in excess of the requirements of peasants living at their homes; but, waiving this objection, it is impossible to accept the cost of such dieting, reduced by less than one-fifth, as representing, even approximately, the cost of living by persons of both sexes and of all ages in all parts of India.

In the first place, the Bengal rate of charge for feeding prisoners (Rs. 28 per annum) is by no means universally applicable; it is certainly not applicable in the Punjab, where food is cheap, and prisoners are liberally dieted* at an average cost, in ordinary years, of less than Rs. 20 or 2L. per head. To be on the safe side, let us assume the average cost to be 2L.

In the second place, the cost of such diet to the population, and especially the agricultural population, is far less than it is in the case of prisoners, and for obvious reasons, for the price of all the constituents of gaol diet, except vegetables, which are grown in the gaol garden, is enhanced by cost of carriage, dealers' profits, agency charges, &c., until it exceeds the price of the same articles at the place of their production by as much, in some cases, as 15 or 20 per cent. To be on the safe side, let us assume the difference of cost to be 12½ per cent. only; this will reduce the cost of diet on the gaol standard in the case of the adult male agricultural population of the Punjab from 40s. to 35s. per head.

In the third place, in the calculation of his average rate, Mr. Hyndman has made a very inadequate reduction on account of the smaller consumption of food by women, youths, and children. In the Punjab gaols the diet allowed to women and youths between the ages of 12 and 16 is about one-fifth less in amount than that of male adults, that required for children between 12 years and infancy may be safely set down as not more, on the average, than half the amount necessary for working men.

Assuming then the entire agricultural population of the Punjab to live as well as the inmates of our gaols, the cost of their food will be as follows:—

	£
3,500,000 adult males at 35s. per annum	6,125,000
3,000,000 adult females at 28s. per annum	4,200,000
1,300,000 youths and girls between 16 and 12 years at 28s. per annum	1,820,000
3,200,000 children at 17½s. per annum	2,800,000
Total	14,945,000

Falling at the rate of less than 28s. per head of population, instead of 46s. per head as estimated by Mr. Hyndman.

As to clothing, the "full dress" of a Sikh cultivator consists of a small turban of coarse cotton cloth, a *khes* or wrapper, short drawers or a waist cloth of the same material, and a pair of stout shoes; in the cold season a cotton quilt or a coarse woollen blanket serves in the double capacity of greatcoat and coverlet. When at work, whether in summer or in winter, he usually dispenses with all save the turban and the waist cloth. Women wear a *lenga* or skirt, a *chadar* or wrapper, generally red and embroidered with rudely

* The diet of an adult male prisoner sentenced to labour consists in the Punjab of nearly one pound and a half of flour per diem, pulses four times a week, meat or curds and butter-milk with vegetables and ghee three times a week, condiments daily, and salt at the rate of 11½ lbs. per annum. This scale of diet was adopted by the Punjab Government, on medical advice, after years of practical experience of the food requirements of prisoners; it has proved sufficient to maintain even the hardest labouring prisoners in excellent health, so much so that in nine gaols out of ten the mortality is less than that of London, and far less than that of the town population of India.

executed flowers, and trowsers reaching to the ankle, all of Indian cotton, some wearing in addition a *choli* or small tight-fitting stomacher. The Mahomedan cultivators are, as a rule, more amply clothed, for, in deference to the injunctions of the Prophet, their drawers descend considerably below the knee, and the waist cloth assumes the dimensions of a skirt, reaching from the middle almost to the ankle.*

The cost of such costume, even in the case of Mahomedans, is not large; judging, indeed, from the clothing charge in gaols, and inquiries made from agriculturists, it must be easy for the Punjab peasant, with the help of homespun cotton, to provide himself and family with raiment and blanketing for 1L. a year while his shoemaker's bill for the whole household need not exceed 6s. These may appear small sums, but it is to be remembered that, in the Punjab, cotton cloth, well suited for the ordinary wear of the agriculturists, can be procured for 1½d. a yard, and coarse woollen cloth or blanketing for 4½d. a yard; that a change of raiment can be bought for 3s. 3d., and a pair of full-sized shoes for 9d. At this rate the cost of clothing the agriculturists of the Punjab may be estimated, on a liberal basis, at 3,000,000L. per annum.

The next item is that of repairs and miscellaneous household expenses.—The following account of the dwellings and household furniture of the peasantry, taken from Colonel Davies' Report of the settlement of the Shahpore district, may be accepted as applicable to all plain districts in the province:—

"The dwellings," he says, "consist of one or more rooms called *kothas*, with a courtyard in front, often common to several houses. The rooms are built ordinarily of clay, gradually piled up in successive layers and then plastered. The roofs are invariably flat, and are used as sleeping places in the hot weather. In the courtyard is usually seen a manger and a house in which the cattle are sheltered from the cold in the winter months, which structures consist generally of four walls covered with a thatch. As a rule, the houses of the peasantry are built for them by the village carpenter or potter, who receive their food while the work is going on, and presents of clothes or money when the work is finished. The timber used for roofing is usually *kikar* (*Acacia arabica*) or *ber* (*zizyphus jujuba*) in the plains, and wild olive in the hills; the first two being usually the produce of the peasant's own fields."

Of furniture, he says:—

"First there are the receptacles for storing grain of various sizes. These are made by the woman of the house of fine clay mixed with chopped straw. Next are to be seen some spinning wheels, an apparatus for churning milk, an instrument for cleaning cotton, a number of circular baskets, with or without lids, made of reeds, in which are kept articles of clothing and odds and ends; trays of reeds used in cleaning grain; a goatskin water bag; a set of wooden measures for grain; a leather bag for carrying flour when away from home; a variety of cooking vessels, some of iron and others of a composition resembling bell-metal; a number of earthen pots and pans, in which are stored grain, condiments, and other articles of food; a coarse iron sieve; a pestle and mortar. These with a few stools and cots complete the list of fittings up to an interior."†

With wood procurable *gratis* on the farm, or from the common, clay in abundance, and straw on the

premises, repairs, whether of house or furniture, must, in households such as those described above, cost almost *nil*. The miscellaneous expenses consist chiefly of cost of oil, tobacco,* and occasional sweet meats, so that if we allow an aggregate sum of 2,000,000L. per annum on account of repairs and miscellaneous expenses combined, we shall have provided the Punjab agriculturists with all that is necessary for a very comfortable existence.

We have now to consider the several items making up the cost of cultivation.

Seed-grain has already been provided for, and so has the cost of labour; and the replenishment of stock has been already estimated to cost 1,000,000L. yearly. As for feed of cattle, plough bullocks are, for the most part, fed *gratis* with chopped straw and husks, stubble, crushed surgar-cane, cotton seeds, and other refuse produce of the farm, with the leaves of certain trees, such as the *ber* (*zizyphus jujuba*), the mulberry, and, in hill districts, the *bahera* (*terminalia belerica*), and from the grazing on the common on the fallows; but their ordinary food has, at certain seasons of the year, to be supplemented by grown fodder, such as clover, trefoil, turnips, moth (*phaseolus acutifolius*) and young green crops. The amount of grown fodder given varies in different districts according to the amount of rain-fall and the extent of pasture land available. In the case of the district of Sylkot, a district with a good rain-fall and a fair amount of grazing land, it is estimated by Mr. Prinsep, late Commissioner of Settlements, to amount for well cattle to 200 lbs. weight per annum, costing, at present rates, about 5s. Assuming plough cattle, not required for irrigation, to receive half the above amount, and all districts to be similarly situated to Sylkot, the cost of supplementary fodder for cattle used in husbandry would, for the province, be 700,000L. But in the drier parts of the Punjab the amount of grown fodder required for the cattle is naturally greater. As an extreme case we may take the district of Dera Ghazi Khan with a rain-fall of about six inches. Here, according to Mr. Fryer,† upwards of one acre in every ten cultivated has to be set apart for growing fodder. At this rate the value of the extra fodder required for the plough and well cattle of the Punjab would amount to 2,200,000L. per annum. The real cost for the province must lie somewhere between these two amounts. Bearing in mind the fact that (1) fodder crops are often omitted from the crop returns, and that (2) they are not unfrequently grown intermingled with, or in addition to other crops, we may, perhaps, estimate the amount to be charged in the Punjab cultivator's account for cost of extra fodder at 1,000,000L. annually.

The next two items, repair and renewal of agricultural implements and keeping well gear in order, can be conveniently taken together. With wood, clay, and material for ropes procurable *gratis* from the farm, or on the common, the cost is not heavy, and may be generally resolved into the making of certain customary grain payments to the potter, carpenter, and blacksmith, and the purchase of a little leather

* Tobacco can hardly be considered a necessary of life in the case of the Punjab cultivators, seeing that the most stalwart and healthy of our peasantry—the Jat Sikhs—do not smoke at all; but as they would appear to solace themselves for their deprivation by free indulgence in opium and spirits, it may be as well to admit a moderate amount of tobacco into the recognized dietary of the agriculturists. Judging from the amount of tobacco produced and imported, the value of the tobacco consumed in the Punjab per head of population, exclusive of the Sikhs, must amount to 9d. annually, or if divided amongst adult males, to 2s. 6d.; but to this must be added 1s. 3d. as the cost of the molasses with which tobacco for smoking is invariably rixed; but there is undoubtedly a good deal too much of the hookah amongst our cultivators, and if I allow to each adult male an annual expenditure of 3s. per head on smoking, I shall be allowing as much as is good for him. The cost of moderate smoking will thus amount in the aggregate to 400,000L. out of the 2,000,000L. allowed for miscellaneous expenses, leaving a margin of 1,600,000L. for oil and other household contingencies and little luxuries.

† Settlement Report of Dera Ghazi Khan, pp. 135–6.

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and iron. Judging from the reports of settlement officers, these charges will be covered, in the case of land irrigated by wells, by about 4s., and in the case of other cultivated land, by about 2s. 6d. per acre annually, the total cost for the province being for well lands 800,000L., for other lands 2,200,000L., or 3,000,000L. in all.

Manure is required for sugar-cane, cotton, Indian corn, poppies, turmeric, tobacco, and garden crops, and is applied to other products also in the vicinity of villages and wells; but, save in the neighbourhood of large towns, it is seldom bought or sold, and the expense of manuring is generally resolvable into cost of carriage and a small grain payment to the village sweeper. The area under crops for which manure is obligatory amounts in the Punjab to about 2,000,000 acres, and the area actually manured may be estimated at double that amount. A lump sum of 600,000L. may be allowed to cover this and other farming contingencies, including 180,000L. on account of water supplied for irrigation from Government canals.

The total cost of cultivation, exclusive of cost of seed grain, labour, and ordinary feed of cattle, will thus amount on the average to 5,600,000L. a year.

Another item remains to be considered, that of taxes. Reserving the general subject of taxation for a later stage of our inquiry, it may be here noted that the only indirect tax to be included in the necessary expenditure of the agriculturist is the salt tax, for he can exist comfortably without spirits or opium, or fine clothes from Manchester, and this tax has already been included in the cost of food; of direct taxes he has to pay (1), the Imperial land tax, falling at the average rate of 1s. 10½d. per cultivated acre, and (2), various rates and cesses for defraying the cost of district roads, education, village police, famine insurance, and other local charges, amounting, in the

aggregate, to 4½d. per acre, the total for the province being, in round numbers—

Land tax - - - -	£ 2,000,000
Local rates and cesses - -	400,000
Total - - - -	2,400,000

IV.

Such being the receipts and expenditure of the Punjab agriculturists, their account will stand as follows:—

Value of produce - - -	£ 42,000,000
Deduct—	£
Cost of food - - - -	15,000,000
Clothing - - - -	3,000,000
Repairs, tobacco, and miscellaneous household expenses - -	2,000,000
Cost of cultivation other than cost of labour, seed grain, and ordinary feed of cattle - - -	5,600,000
Land tax and local rates and cesses -	2,400,000
Total - - - -	28,000,000
Balance in favour of agriculturists -	14,000,000

Let us now test the correctness of this calculation by dealing with the matter somewhat more in accordance with reality. Instead of deducing a subsistence rate from the cost of feeding prisoners, let us allow from the produce of the land an amount sufficient for the comfortable subsistence of the peasant population, and see what is the value of the surplus. Again, taking our liberal gaol dietary as the standard of healthy subsistence,* we have the following result:—

	Average Amount produced (after Deduction for Seed) in Lbs. (000,000's omitted).	Required for Food of Agricultural Population (000,000's omitted).	Surplus for Sale in Round Numbers (000,000's omitted).	Value of Surplus at Average Market Rates.
Wheat - - - - -	4,960	1,100	3,860	£ 9,650,000
Inferior Grains, viz., Barley, Maize, and Millet - - -	4,600	3,390	1,200	2,000,000
Pulses - - - - -	1,240	620	600	1,400,000
Meat - - - - -	300	165	135	1,200,000
Vegetables - - - -	1,200	730	470	300,000
Condiments - - - -	100	47	53	420,000
Ghee and Butter-milk - - - -	†128	47	81	2,000,000
Milk and Curds - - - -	256	160	96	300,000
Tobacco - - - - -	74	44	30	120,000
				17,390,000

To the value of the surplus produce shown in the above table, we must add—after like deduction for seed—

Value of rice crop - - -	£ 3,200,000
„ oil seed - - - -	940,000
„ cotton - - - -	940,000
„ sugar-cane - - - -	1,692,000
„ indigo - - - -	180,000
„ poppy - - - -	50,000
„ miscellaneous - - -	1,440,000
„ hides and skins - -	800,000
„ wool - - - -	800,000
„ of cattle sold - - -	1,500,000
„ firewood and timber -	3,500,000

15,042,000

Making the total value of produce

for sale - - - -

Or in round numbers - - -

32,432,000

32,000,000

Deducting from this—

- (1.) Ten per cent. as the difference between market and village prices - 3,200,000
- (2.) Cost of clothing - 3,000,000
- (3.) Cost of salt, oil, and miscellaneous household expenses - 2,000,000
- (4.) Cost of cultivation other than cost of seed, labour, and ordinary feed of bullocks - 5,600,000
- (5.) Taxes (Imperial and local) - 2,400,000

Total - - - - 16,200,000

We have a balance of - - - 15,800,000

* Although I have taken the gaol dietary as the standard of healthy subsistence for the Punjab population, I do not wish it to be understood that it represents the dietary of the well-to-do classes in all parts of the Punjab; in some localities and by some castes more grain is consumed and less meat, and vice versa. Some few tribes, such as the *Bhabaraks*, wholly abstain from meat; others, especially the Mahomedan tribes on the frontier, consume it in large quantity.

† Exclusive of butter-milk.

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Again, let us test our conclusions by another process. In the Punjab the proprietor frequently takes his rent, not in money, but in kind, leaving the tenant cultivator a share of the produce sufficient to support himself and family and cover all expenses of cultivation. If, therefore, we can ascertain the share of the produce left to the most favoured class of cultivating tenants, we shall have another means of gauging the cost of living and cultivation on admittedly comfortable terms. Fortunately this information is available, for among the Punjab Government's statistical returns for 1875-76 is one of great interest and value, entitled "Statement of Tenures not held direct from Government," which gives *inter alia* a return of the proportion of the crop taken by proprietors from all classes of cultivating tenants. From this statement it appears that in the case of the most privileged class of tenants (viz., those with right of occupancy), the proportion left to the tenant is generally two-thirds of the crop, but very often less—in some cases less than half the crop.* We might, therefore, fairly assume the value of two-thirds of the crops of the Punjab as a very liberal provision for all the expenses of its peasantry; but for safety's sake let us go further; let us assume the cost of cultivation and comfortable living to be represented by the value of *three-fourths* † of every class of crop. The average market value of the crops of the Punjab being, as we have seen, 36,000,000L., and their average value to the producer ten per cent. less, or 32,400,000L., three-fourths of this latter sum, or 24,300,000L., will accordingly represent the money value of the share we have assigned for cost of cultivation and subsistence; if to this amount we add the sum of 2,400,000L. for taxes (Imperial and local) and deduct the total (26,700,000L.) from 42,000,000L., a balance remains of 15,300,000L.

We have thus arrived by three different processes at an estimate of the profits of the Punjab agriculturists; the calculation being made in each case on the principle of giving the agriculturists the benefit of every doubt, and avoiding everything approaching to exaggeration of receipts or under-estimating of charges. Of these three processes, one brings out an average profit of 14,000,000L., another of 15,800,000L., while the third, which is perhaps the most practical and reliable, an average profit of 15,300,000L. We are, therefore, in a position to assert with some confidence that, after liberal provision has been made for the necessary food, clothing, and household expenses of the entire agricultural population, the cost of cultivation and all taxes, Imperial and local, there will remain in ordinary years to the peasant proprietors of the Punjab a balance of profit from the land of at least 14,000,000L. sterling, a balance available for meeting losses in bad years, payment of interest on loans, and thereafter for expenditure at discretion on English calicoes and other luxuries, improved accommodation, extension of cultivation, and last, not least, upon gold and silver ornaments and marriage feasts.

V.

At this point an English reader may be tempted to remark, "It is all very well to talk about the

* The following are the details:
Of tenants paying rent in kind there are—

- I. Tenants-at-will—
 - (1.) Paying ½ produce and more - - 295,273
 - (2.) „ less than ½ produce - - 230,465
- II. Tenants with right of occupancy—
 - (1.) Paying ½ produce and more - - 41,248
 - (2.) „ ¼ produce and less than ½ produce 47,588
 - (3.) „ ⅓ „ „ „ 25,408
 - (4.) „ ⅔ „ „ „ 9,286

† The liberality of this assumption may be measured by the fact that in Italy, where the standard of living and cost of cultivation are, from climatic and other reasons, far higher than in the Punjab, the share of the produce left to the *metayer* tenant is usually *one-half*—in Tuscany as little as *one-third*. In Northern Russia, where the soil is far from rich, while the cost of living and cultivation is greatly enhanced by the rigours of the climate, the *metayer* tenant retains, according to Huxthausen, only half the produce. In the Native States of the Punjab the share of the produce left to the cultivator, is, as a rule, far less than in British territory.

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"agricultural community of the Punjab obtaining a net profit from the land of 14,000,000L. per annum; the sum appears large when stated in the lump, but if divided amongst the agricultural population, it amounts after all to little more than a profit of 6L. per family."

The criticism is a very natural one; but in estimating the value of this sum to its recipients it is necessary to remember that in a society where a pair of shoes can be bought for 9d., a suit of clothes for 3s. 3d., where meat costs 2d. and flour a halfpenny a pound, a plough 5s. and a harrow 10d., and where other articles of ordinary use are proportionately cheap, a profit of 6L. is equivalent to a profit of at least 60L. in England. How many English peasants save 60L. a year?

Another point has to be borne in mind, namely, that our calculation of the profits of the agriculturist has been made on the supposition that grain is fairly cheap; but should it happen, as it has not unfrequently happened of late years, that the price of produce rises, not from failure of the local harvest, but in consequence of extensive exports, then the cultivator's profits increase rapidly. If grain produce rise in price by as little as one seer (2 lbs.) in the rupee, he gains, in the case of wheat, an additional profit of 1s. 3d. on every acre's produce sold, and in the event of a general rise to that amount the agricultural community of the Punjab is richer by 500,000L. Of course in a country like the Punjab, dependent for more than two-thirds of its agricultural produce upon a very uncertain rain-fall, the reverse process not unfrequently takes place; but owing, it may be presumed, to the steady improvement of our communications, the general tendency of prices for the last 20 years has been to rise.*

But we have not yet finished with the income of the agriculturists. Besides the profits realized from the land, the cultivating proprietor or tenant makes no inconsiderable gain from hiring out his cart in the slack season for transport of goods or merchandise, while agricultural labourers earn large sums by working on canals, railways, and other public works. At the present moment large numbers of the peasants are receiving as much as 9d. a day for earth-work.

Then many a peasant has a son or brother or other member of his family in the service of the Government as sepoy, policeman, or revenue official, or employed upon the railway, who contributes from his earnings to the common stock; some 200,000 hold the office of village headman, receiving a commission of five per cent. on all taxes they collect, while not a few of our peasant proprietors are the happy possessors of a plot of revenue free land.

Lastly, should any peasant proprietor desire to improve his holding, to increase his income by sinking a well, constructing an embankment, or other work of permanent utility, he can obtain a loan from Government at six per cent. per annum.

But here a political economist will perhaps offer a remark: "Granted that profits from the land in the Punjab may amount to a considerable sum, pray, how is the amount distributed? For it is possible to have a wealthy landed interest side by side with an impoverished agricultural population."

* Take, for instance, the price of wheat; from 1858 to 1861 it rose steadily from 41 lbs. a shilling to 18 lbs. a shilling; from 1861 to 1863 it fell, but only to 31 lbs.; in 1863 to 1869 it rose steadily to 14½ lbs.; between 1869 and 1876 it again fell, but only to 25 lbs.; in 1877 it again rose. But the tendency of prices to rise, irrespective of the effects of drought, is better exemplified in the case of crops usually requiring irrigation, and thus more or less independent of rain, such as rice, sugar, and cotton. The price of rice has risen with considerable fluctuations from 17½ lbs. a shilling in 1857 to 9 lbs. a shilling in 1877, or nearly 100 per cent.; of unrefined sugar from 14 lbs. a shilling to 11 lbs. a shilling, or by 20 per cent.; cotton steadily from 4 lbs. a shilling to 3 lbs., or 25 per cent., except during 1863-64, when it rose to 2½ lbs. a shilling. Meanwhile, be it remembered, the land tax has been almost stationary.

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To this very pertinent inquiry I can reply, on the authority of the tenure statement above referred to, that the profits are as widely distributed as they well can be with benefit to the community. In the Punjab there are no millionaire proprietors; indeed, there are but nine individuals in the whole province whose land tax exceeds 500*l.* per annum. Of the entire agricultural population—

- 2,000,000 are proprietors of land in common or in severalty, with an average holding of 13 acres of cultivated and fallow land, exclusive of rights in the uncultivated area, the proprietor, as a rule, cultivating seven acres himself, and letting the remainder to tenants on the *metayer* system;
- 500,000 are tenants with right of occupancy, with holdings averaging six acres;
- 1,200,000 are tenants-at-will, with holdings slightly smaller;

and the rest of the agricultural population is composed of the families of the above-mentioned classes, and a limited number of farm-labourers. As a rule, the produce of six acres will support an agricultural family in comfort. In a community so constituted the benefit of any general increase of wealth derived from land, whether owing to rise of price or the introduction of more valuable staples, is felt not by a few great capitalists only, but by almost every member of the agricultural population.

But here it may be urged, by some new critic, fresh from the pages of the *Nineteenth Century*: "Granted that your peasants may realise great profits, and that these profits are theoretically well distributed, is it not true that they are all pledged to the village banker? And is it not the case that the ancestral lands of the peasant population are passing with terrible rapidity from the possession of the hereditary owners into the hands of the money-lending class?"

To this important question a complete answer can fortunately be given. Those who require a reply in detail will find it in the published Administration Reports of the Punjab Government for the last four years. In this place it will suffice to mention the principal facts which those reports record. It is there shown that of the cultivated area of the province comprising, with fallows, 25,000,000 acres, less than one-fourteenth part is under mortgage—no less than 23,240,000 acres being unencumbered;* that the number of suits for debt against the agriculturists of the Punjab is far less in proportion to population than the number of debt-suits in England; for while in the Punjab one agriculturist out of 110 is annually sued for debt, in England one person out of 22 has yearly to undergo that unpleasant operation; that transfers of agricultural land, so far from being alarmingly frequent, are, in proportion to the extent of acreage, singularly few and unimportant; the sale of ancestral land by decree of court being, indeed, almost unknown, while, in spite of tempting prices, the amount transferred by private sale is less than one acre per annum per square mile of assessed area, of which by-the-by, the greater portion passes into the hands, not of money-lenders, but of agriculturists; that the average selling price of land has risen steadily from four years' purchase of the land revenue demand in 1859 to thirty years' purchase in 1876-77, and that nearly the same amount can be raised by mortgage as can be raised by sale.† It is shown, in short, by statistics procured from every district in the province, that the peasant proprietors of the Punjab, so far from being, as a body, insolvent or oppressed with

* Compare with this the situation in England, where, according to Mr. Laveleye, mortgages amount to 58 per cent. of the value of the land, and in Lombardy, where they amount to 25 per cent.; even in France, the paradise of peasant proprietors, one-tenth of the land is said to be under hypothecation.

† In Flanders, says Mr. Laveleye, the selling price of land has doubled since 1830. "These results," he adds, "are not equalled in any other part of Europe." In the Punjab the selling price of land has more than trebled in less than half the time. In 1864 it averaged 11*s.* an acre; it now averages nearly 40*s.*

debt, are eminently prosperous; being not only, as we have already seen, the recipients of an average surplus income of at least fourteen millions sterling, but blest with an available, but unused, credit at their bankers for nearly sixty millions more.

What, then, it may be asked, is the practical and visible result of this agreeable state of things? The result it may be answered, can be seen in the steady increase of cultivation which has taken place of late years in the Punjab; the extension of the irrigated area by means of private capital, the increased production of more valuable crops, the gradual substitution of masonry dwellings for mud huts, of brass for earthen vessels, in increased expenditure on silks and metals, in large consumption of goods from Manchester,* in decreasing applications for loans from Government, and in the general contentment, loyalty, and thriving aspect of the population. It is seen also in the fact that, notwithstanding a large export of grain in 1876, the markets were so overflowing that there was danger of a glut; that, in spite of a total failure of the autumn harvest of 1877, there was no general distress in the Punjab, and that, after an export of 400,000 tons of grain in 1877-78, wheat was selling at 15 *lbs.* a shilling.

A word regarding *taxation*. The Imperial and provincial revenues and receipts of the Punjab amounted in 1876-77 to 3,630,000*l.*; adding to this amount 200,000*l.* on account of sea customs duty collected at the ports on articles consumed or used by the people of the province, and deducting, on the other hand, the following items:—28,000*l.* paid as tribute by Native States; 80,000*l.*, sugar export duties, paid by foreign consumers, 130,000*l.* postal receipts, a reasonable charge for service immediately rendered; 160,000*l.* canal water rate, an optional payment for an article supplied; 90,000*l.* forest receipts, and 55,000*l.* gaol receipts, proceeds of goods sold or labour supplied, and 41,000*l.* fines for criminal offences, we have the following result, viz., that the sum taken by the State from the pockets of the people for general purposes of administration amounted, according to latest information, to 3,246,000*l.*, falling at the rate of 3*s.* 3½*d.* per head of population. If to this be added 400,000*l.* on account of local rates and cesses, the sum total of Imperial and local taxation combined will not exceed 3,646,000*l.*, falling at the rate per head of only 3*s.* 8½*d.*

After what has been said above, it is hardly necessary to observe that the weight of taxation in the Punjab, even in the case of the agricultural population, who pay the lion's share, is anything but "crushing." The indirect taxes, salt, excise, and customs, are included in the cost of living and paid insensibly; the land tax† which in Sikh times varied from one-half to one-third, is now nominally one-sixth, but practically about one-sixteenth of the value of the produce. Moreover, in Sikh times, stock and dairy produce was taxed, and sometimes heavily; it is now practically untaxed, for the assessment of grazing lands is nominal.‡ As for local rates and cesses I can perhaps best indicate their lightness by stating that the ordinary cultivator can defray them all, including Sir John Strachey's famine

* See Appendix.

† For brevity's sake I have used the word land tax to denote the Government revenue derived from land; but, as frequently pointed out, the land-revenue of India is not really a tax any more than the revenue of Crown lands in England is a tax. It is the portion of the rent taken by the State in virtue of its position as proprietor in chief of the soil—a position inherited by the British Government from its predecessors, the Moghul Emperors, and held by it in common with every Eastern potentate. But even if it be regarded as a tax, it is, in the Punjab, a very light one, as will be seen from the succeeding note.

‡ As some critic may complain of my going back to Sikh times for a standard of comparison, I venture to give a few examples of the rate of the land tax in civilized countries at the present time. In Italy, according to a writer in the *Spectator* for the 16th November 1878, the landowners have to pay a tax on their *prediali* amounting on the average to thirty per cent. of their incomes—the proportion being, in some cases, more than forty per cent. According to Mr. Zincke's article in the *Fortnightly* for November, the peasant proprietor

insurance rate,—and improve his constitution into the bargain,—by reducing his smoking to three pipes a day, or, if he be a Sikh cultivator who does not smoke, by a slight reduction in the amount of his potations or of his daily allowance of opium or post.* But while the pressure of the local taxes is thus hardly felt, the benefits derived from them are immense, though not always as much valued as they ought to be. From local taxation the cultivator is provided with roads to his market, which he thoroughly appreciates; postal communication with the headquarters of the district and the Imperial postal lines, which he is beginning to appreciate; and education for his children,—which I fear he does not as yet appreciate at all. He is provided, besides, with a hospital within reach, a watchman, and the services of a surveyor and accountant.

But another objector may arise and say, "It is all very well to prove statistically that the peasantry of the Punjab are lightly taxed and prosperous, but your statements are so *very* satisfactory that you must pardon me for doubting their correctness. Have you seen, with your own eyes, the prosperity you so logically describe?"

To this direct appeal, if made, I can reply as follows: "I know every district in the Punjab. I have watched its progress with deep interest for many years, and from many points of view—as a judicial, as an executive, as an administrative officer,—and I know that my story, though widely different from Mr. Hyndman's, is substantially correct. I do not, of course, claim for the Punjab the attributes of Paradise. There, as in more favoured regions, are to be found some cases of depression and distress; there, as elsewhere, the people have their grievances, and vast, indeed, is the room for progress and improvement; there are villages which suffer from over-population; there are villages which suffer from over-irrigation; some villages there may be, but very few, in which the land tax presses; there, as elsewhere in India, inundations, cattle disease, locusts do their work of destruction; and epidemic disease, in the shape of cholera and the *colera febrilis*, is not unknown. Then as to grievances, there are grievances about forest conservancy (a form of civilization not appreciated by the people), grievances about canal water supply (especially in the matter of having to pay for it), grievances about grazing lands, grievances about sanitary laws; moreover, though, as a body, the peasantry are flourishing, there are, doubtless, individual cases of embarrassment; and, in the event of a failure of the harvests, there is a residuum of the agricultural population, possessing little or no land, which readily succumbs. But the cases of distress are exceptional, and the grievances are not serious, and, take it all in all, I venture to assert with confidence that Her Majesty has few subjects more well-to-do (in their small way), few more contented,

in the Limagne pays for house and lands comprising 6 *hectares* or 15 acres, taxes to the amount of 6*l.*, or 8*s.* an acre, yearly, besides 3*d.* on every bottle of home-made wine he sells. If comparison be made between the Punjab and Native States, the difference in favour of the Punjab cultivator is striking. In Cashmere the recent cash settlement was made on the principle of the State being entitled to the value of sixty-three per cent. of the gross produce. In Bhawalpore, which is being temporarily administered by British officers, the taxation, after being immensely reduced under our auspices, falls at the rate of 8*s.* per head of population. In Egypt, according to Mr. McCoan, the land tax falls, in the case of ordinary tenures, at the rate of 22*s.* per acre.*

* An ordinary cultivator, with a holding of six acres, pays in local rates and cesses about 2*s.* 4*d.* annually; but, as we have already seen, he expends 3*s.* 9*d.* on his *hookah*, which he smokes, on an average, nine times a day. A Sikh cultivator will not unfrequently expend annually on spirits or opium, or both, a sum sufficient to pay, not only his local taxes, but a large portion of his land tax in addition. The superior sturdiness and vigour of the Sikh cultivator, who drinks freely, but does not smoke, as compared with the Mahomedan cultivator, who smokes freely, but does not drink, is certainly a "fact" for the Anti-tobacco Association. *Post* is a deception from the poppy, much favoured by Sikhs, especially of the Cis-Sutlej districts.

"few more well affected, than the peasant cultivators of the Punjab."

"If specific instances of visible improvement are required, they can be given in abundance. In the year 1858 I visited the battle field of Chillianwallah. There was then but little cultivation, and the eye wandered for miles and miles over an expanse of dreary jungle. In the spring of 1870 I again visited the locality in the suite of the late Lord Mayo. The scene was completely changed. The dreary jungle had become a sheet of cultivation interspersed with groves of trees. So great, indeed, was the transformation that an officer on the staff, who had been present at the battle, failed to recognize a single feature in the landscape. Again, when marching through the Multan district a few years ago, I had the good fortune to be accompanied by an English officer who had been employed in that part of the Punjab since 1850. As we proceeded deputations of well-dressed villagers came out to welcome us, many of them mounted on excellent horses, with velvet-covered saddles and gold and silver trappings. 'How different was the scene,' observed my companion, 'when I went over this ground in 1850. In those days every village seemed in the last stage of poverty, even the headmen being scantily clothed in the coarsest cloth. As for horses, such a thing was not to be seen, and if, here and there, we met with a mounted headman, he was mounted, not on a caparisoned steed, but on the bare back of a half-starved pony, with a bit of old rope doing duty for a bridle.' Again, in Yusafzai, on the Peshawar border, I traversed during 1865 miles and miles of *maira*, or uncultivated waste, all of which is now under the plough; indeed so far back as 1870, the officers of the Guide Corps were bitterly complaining of the disappearance of the florican, and the curtailment of the hunting grounds owing to the rapid increase of cultivation. Again, on the western frontier, I have frequently seen villages surrounded with waving crops, extending for miles up to the extreme limit of British territory, and have been assured that, 20 years ago, all beyond matchlock-range of the hamlet was uncultivated and desolate. Many are the other instances I could give of visible improvement in the circumstances of the Punjab cultivators during the last 20 years, but space and time, and respect for the patience of my readers prevent my pursuing this agreeable subject further."

So much for the past and present—one word as to the future of the province. Of land comprised within the surveyed boundaries of villages, there are upwards of ten millions of culturable acres as yet untitled; should these be brought under the plough or otherwise fully utilized, or should individual villages desire relief from over-population, there are nine millions of acres of culturable waste at the disposal of the State available for the formation of new settlements; and out of these nine million acres, more than two millions have water within irrigable distance from the surface of the soil. In addition, moreover, to these culturable acres, there are tens of millions of acres now unculturable, but destined to become of immense value when the waters of the Indus, the Jhelam, and the Chenab shall have been brought to fertilize the almost rainless tracts on the west and south of the Punjab. With a large area for extension of cultivation, a fairly fertile soil, great capabilities for irrigation, an increasing population, a growing trade, and a railway to its natural port, Kurrachee—the future of the Punjab is one of abundant promise.

VII.

Before concluding, I must notice another count in Mr. Hyndman's general indictment. He asserts that the productive power of the soil of India is and has been steadily deteriorating. This *may* be the case; indeed theorists contend that it *must* be the case; but I have seen no evidence worth a moment's consideration that it really is the case. Of course, it is possible to produce instances here and there of lands exhausted by over-cropping, or defertilized by over-irrigation, but

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of general deterioration of the soil in the Punjab, there is, to the best of my knowledge and belief, no proof whatever deserving of the name. Meanwhile, I can mention, on the high authority of the present Lieutenant-Governor of the province, a fact which hardly favours such a supposition, namely, that the average yield of wheat in unmanured land in the Punjab, as ascertained by a series of experiments, is *greater* than the average yield of wheat in unmanured land in England—the former being 880 lbs. per acre, the latter 843 lbs. only.

VIII.

To sum up;—my answer to Mr. Hyndman's general indictment is, in the case of the agriculturists of the Punjab, that he has greatly under-estimated their income; that he has greatly over-estimated their cost of living; that he has assumed a general impoverishment that does not exist; and a general deterioration of the soil that is not proved; that the peasant population of the Punjab, so far from being on the road to bankruptcy and ruin, are on the high road to increased prosperity and wealth.

T. H. THORNTON.

Calcutta, January 1879.

APPENDIX.

In support of my statements made regarding the prosperous condition of the Punjab peasantry, I subjoin a few statistics taken from official reports and returns:—

1. *Increase of cultivation.*—Returns of cultivated area in the Punjab are prepared every five years, the first published being that for the year 1868–69.

The Return for 1868–69 gives the cultivated area of the province as 20,171,558 acres.

The Return for 1873–74 gives it as 22,640,889 acres.

	1868–69.	1869–70.	1870–71.	1871–72.	1872–73.	1873–74.	1874–75.	1875–76.	1876–77.
	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.	Acres.
Wheat	5,577,005	5,654,637	5,402,473	5,366,977	5,716,867	5,820,861	6,025,771	6,282,687	6,609,497
Oil seeds	439,155	462,430	610,416	540,140	638,905	722,648	739,167	838,794	846,689
Sugar-cane	325,831	342,605	370,195	333,657	372,824	374,125	297,136	383,029	391,630
Indigo	32,444	82,039	61,439	67,736	72,674	89,959	118,815	84,333	129,465

Thus the cultivation of wheat and sugar-cane has increased in nine years by about 20 per cent., that of oil seeds has nearly doubled, and that of indigo quadrupled. It may be added that the area under tea has increased from 5,521 acres in 1868–69 to 10,046 acres at the present time.

4. *The gradual substitution of masonry dwellings for mud huts* cannot, unfortunately, be proved by statistics, but it is a matter of common observation; the substitution of *metal for earthen vessels*, and I may add of imported steel for native iron in the manufacture of plough shares, is not only a matter of observation, but is evidenced by the increase which has taken place, of late years in the amount and value of metals, and metal manufactures imported. See next paragraph.

5. *Increased expenditure on silks and metals, and large consumption of goods from Manchester.*

The following statements compiled from the Punjab trade returns will be of interest. It is to be regretted that the information cannot be given from an earlier date, but, unfortunately, arrangements for registering the trade of the province were not completed until 1873–74.

Thus the cultivated area of the province was increased in five years by nearly two and a-half millions of acres; or, to put the matter more familiarly, a new tract of country was brought under the plough equal to five counties of the size of Surrey.

2. *Extension of irrigation by means of private capital.*—The statistics of irrigated area are also prepared quinquennially. The Returns for 1868–69 and 1873–74 give the following information:—

	1868–69.	1873–74.	Increase.
AREA IRRIGATED.	Acres.	Acres.	Acres.
(1.) By Government canals	1,372,987	1,618,854	245,867
(2.) By private works (i.e., by wells, watercourses, or canals constructed by or at the expense of agriculturists).	4,611,904	5,000,481	388,577
TOTAL	5,984,891	6,619,335	634,444

Thus between 1868–69 and 1873–74 the irrigated area was increased by means of private capital to the extent of 388,577 acres, or 607 square miles. In other words, in the space of five years the peasant cultivators of the Punjab brought under irrigation, and thus secured from drought, at their own expense, a tract of country twice the size of Middlesex; or, to put the matter still more strikingly, they brought under irrigation in five years an area greater than that watered by the *Bari Doab Canal*; a work which has been upwards of twenty years under construction and has already cost nearly 1,500,000*l.* sterling.

3. *Increased cultivation of the more valuable crops.*—Returns of the principal crops of the Punjab are published annually; from these returns I have compiled the subjoined statement showing the development of the cultivation of the following staples, *wheat, oil seeds, sugar-cane, and indigo*, between 1868–69 and 1876–77.

(1.) *Metals and metal manufactures* (exclusive of railway material, machinery, and bullion).

YEAR.	IMPORTS.		EXPORTS.	
	Weight in Maunds of 80 lbs.	Value in £s.	Weight in Maunds of 80 lbs.	Value in £s.
1874–75	177,378	£ 255,843	44,831	£ 67,163
1876–77	265,939	355,661	52,265	85,073

(2.) *Silk and Silk goods.*

YEAR.	IMPORTS.		EXPORTS.	
	Weight in Maunds of 80 lbs.	Value in £s. at 50 <i>l.</i> a Maund.	Weight in Maunds of 80 lbs.	Value at 50 <i>l.</i> a Maund.
1874–75	10,311	£ 515,550	Returns incorrect.	£ Returns incorrect.
1876–77	10,953	547,650	3,735	186,750

(3.) *Piece goods (European).*

YEAR.	IMPORTS.		EXPORTS.	
	Weight in Maunds of 80 lbs.	Value at 12 <i>l.</i> a Maund.	Weight in Maunds.	Value at 12 <i>l.</i> a Maund.
1874–75	341,474	£ 4,097,688	61,711	£ 740,622
1876–77	353,964	4,247,568	78,212	938,544

From the third of the above tables it will be perceived that the value of the cotton goods from Europe,

Note on Mr. Thornton's criticism on Mr. Hyndman's Article.

1. *Mr. Thornton's method.*—Mr. Thornton has confined himself to the consideration of the economic condition of the agricultural population of the Punjab, leaving the non-agricultural population to be dealt with in another paper. He has calculated the produce raised by them, their necessary consumption, and the surplus remaining for comfort or luxury; and he has made this calculation in two ways: first, assuming that they sell everything which they raise and buy everything which they consume; second, assuming that they consume what they require of their home-raised crop, and sell the surplus.

2. *The census figure for "Agriculturists" questioned.*—The first datum required for such a calculation is the number of the agricultural population, and this figure Mr. Thornton has taken from the census report. I venture to think that the census statistics can hardly be trusted implicitly in such a matter as this. According to them, the agricultural population was 55 per cent. of the total, or 9,683,000 out of 17,611,000; and Mr. Thornton has assumed that since the census was taken in 1868 the population has increased to 20 millions (an increase of 13·5 per cent.), and the agricultural to 11 millions (an increase of 13·6 per cent.). This assumption is extremely doubtful; but it is not my present purpose to enter in that subject. The urban population of the Punjab was 1,972,000, leaving the rural population at 15,639,000, of whom only 9,683,000 are engaged in agricultural pursuits; so that if the census statistics may be trusted, there are 6 millions of people living in the Punjab villages who neither own land nor cultivate it, nor labour on it for wages. Surely the experience of those who have been long engaged in district work, and who know how few people there are in the villages who are unconnected with the land, would lead them to suspect that there must be some error here.

3. *Comparison with the statement of landed tenures.*—The suspicion is strengthened by an examination of the census figures. Those who are returned as agriculturists are divided among the following classes:—

Proprietors	-	-	-	5,876,067
Tenants	-	-	-	3,245,469
Labourers	-	-	-	318,845
Shepherds	-	-	-	109,585
Graziers	-	-	-	57,429
Herdsmen	-	-	-	75,169

To these, at any rate, should have been added the jaghirdars, 46,408 in number, who are only proprietors under another name.

But the statement of landed tenures for the Punjab, drawn up for the year 1875–76, gives the following figures:—

Proprietors or shareholders in estates	2,445,018
Tenants (number of holdings)	1,677,486

imported into the Punjab for home consumption, amounts (at 12*l.* a maund, a rate of valuation fixed by the Punjab authorities after very careful inquiry) to about 3,300,000*l.* annually. Deducting from this sum 20 per cent. for cost of carriage and dealers' profits, the balance, 2,640,000*l.*, will represent the seaport values of the goods consumed in the Punjab. But the total value of cotton goods imported into India amounts, after deduction of re-exports, to 18,000,000*l.* annually. It would therefore appear that, in spite of remoteness from the sea-board, the Punjab, with a population equal to about one-thirteenth of the population of India, consumes upwards of one-seventh of the cotton goods imported. The returns for 1877–78, just received, show a falling off in the piece goods trade, but this was to be expected in view of the almost total failure of the autumn rain crop of 1877, and the depressed state of trade with Cabul and adjacent countries.

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What do these figures represent? If the same procedure is followed in the Punjab as in the North-Western Provinces, in regard to the record of proprietors, the name of the head of the family only is entered while he is alive, but if he dies leaving a widow and children the names of all of these are entered; so that the 2,445,018 cannot stand for heads of families, but for some smaller figure, and should perhaps be multiplied by $2\frac{1}{2}$ to obtain the population it represents. On this hypothesis the proprietary population is 6,110,000, or say 6 millions. But the number of tenants' holdings represents in most cases an entire family: their average area is 6 cultivated acres, which can hardly be tilled by less than one adult male, assisted by his family, and thus the tenant population would be $4\frac{1}{2} \times 1,667,000$, or 7,127,000. Add to these the 562,000 labourers, shepherds, &c., of the census and we have an agricultural population of 13,800,000, or nearly 90 per cent. of the rural population. This is the same proportion as I have arrived at in a separate calculation as the true percentage in the North-Western Provinces.

4. *Numbers classified as non-agriculturists, but engaged in agricultural pursuits.*—There is another way of considering the question. Mr. Thornton has included, among articles raised by the agricultural population, milk and its products, wool and hair, hides and skins, meat, animals for draught or dairy purposes, and timber for building and fuel. Now it is obvious that many of these articles are raised by other classes than those enumerated in the census among the agricultural population. Among the non-agriculturists I find milkmen who must probably have something to do with raising as well as selling milk; butchers who breed cattle for slaughter as well as buy them; carpenters, woodsellors, and charcoal-sellers who cut as well as sell timber and fuel; tanners or chalmers who strip the hides off dead cattle without any reference or remuneration to the late owner, the agriculturist. All these ought to be added to the agricultural classes, if the value of their wares is to be entered as an agricultural product; besides which it is well known that there is a vast number of people who combine agriculture with some other profession. Blacksmiths, masons, carpenters, potters, barbers, washermen, salt and saltpetre makers, oil pressers, grain-dealers, and grain-parchers, weavers, petty shopkeepers, priests and pandits—all these, besides their special hereditary profession, very often own or cultivate a little bit of land, and thus swell the list of tenants in the statement of landed tenures. But I have dwelt sufficiently on this subject in my note on the agricultural population of the North-Western Provinces, which I propose to submit to Mr. Thornton for his consideration, as an appendix to these remarks.

5. *Suggestion as to true figures for agricultural population.*—On the whole, then, I should be inclined;

Urban	-	-	1,972,000
Rural—engaged in agriculture only	-	-	10,000,000
engaged partly in agriculture and partly in trade	-	-	3,800,000
non-agricultural	-	-	1,800,000

If any such hypothetical allowance is to be made for the supposed increase of population since 1868, as Mr. Thornton has made, then the agricultural population (including those partly engaged in trade) should be raised to 15,600,000.

6. *Difficulty of separating agriculturists from non-agriculturists.*—But the very fact that there does undoubtedly exist in every province of India such a mixed class as I have described seems to me fatal to the possibility of arriving at the truth by the method Mr. Thornton has adopted. We cannot separate the agricultural population in any such distinct way as he has done from the non-agricultural so as to be able to say: this is the value of the articles produced by such a class, and, deducting their consumption, there is so much surplus. If we attempt this, we either fall into the error which I venture to think Mr. Thornton has fallen into, and attribute to 11 millions the products raised by the labour (at least the partial labour) of 15 millions; or we should fall into the opposite error, and assume that the 15 millions produced nothing but agricultural produce, whereas a certain number of them also earn part of their livelihood by their trade as weavers, carpenters, smiths, &c.

7. Another method suggested. Classification into rural and urban.—A truer hypothesis would perhaps be that all the rural population live off the products of the land, exchanging their wares among each other by a simple process of customary barter without any need of coin. The agriculturist does not, I submit, pay to the leather-worker 400,000*l.* a year for his shoes; he gives the chamar the hides of dead cattle free; he gets as many shoes from him as he wants; and he pays him by a fixed quantity of grain at harvest-time. The carpenter and smith are paid in the same way for making and repairing agricultural implements; the village weaver makes clothes, and the shepherd weaves blankets; the washerman and the potter work for the village in which they were born, and their fathers worked on the same terms, that is, payment of a fixed quantity of grain per plough, or per house, or per acre, or per well, as the custom may be. All these are fed off the land; they rarely save anything; their wage is practically the measure of their consumption. They are dependents and hangers-on of the agriculturist, and he on his part has no occasion to pay for clothes, for house repairs, for field implements, or house utensils, any more than if he grew them. The whole rural population may thus be taken as homogeneous, all its ordinary wants being supplied from the land. The only true class-distinction that can be drawn is, I conceive, that between the urban and the rural population. To the town goes the surplus food-grain and almost all the non-food-produce of the land, by the sale of which the agriculturist pays his rent or revenue and buys his luxuries—English cloth, refined sugar, spices and salt, and so forth. Of course this assumption is not absolutely correct any more than the other; the town population comprises a few who are actually agriculturists and till the lands surrounding the town, and still more who are the dependents of agriculturists, weaving and working for them in return, not for a price, but for a customary fee, just as the village artisans do. But, on the whole, it seems to me safe to say that the great majority of townspeople either live on their rents and private incomes, or else live by trades which mainly consist in exporting the surplus raw produce of the country, and in retailing to the rural population the finer articles of use and luxury which the villages cannot produce.

8. *Application of this method.*—I think, then, that a fairly correct estimate of produce, consumption, and surplus can be made on this assumption; and I propose to draw out the calculation accordingly, following as far as possible Mr. Thornton's method, except in a few details where I shall offer reasons for adopting a different conclusion from his. Accepting Mr. Thornton's hypothesis that the population has increased to 20 millions (though, as I have said, it appears to me a very doubtful one), the urban population will be 2 millions, the rural 18. "

9. *Food crops*.—Mr. Thornton states the main agricultural products of an average year thus:—

	Acres.	Rate of production per acre.	Outturn in tons.	Value in rupees.
Food crops -	17,535,000	691 lbs.	5,412,500	—
Non-food crops -	3,465,000	Rs. 21-10	—	7,50,00,000

Major Wace, in the reply to the Famine Commission drawn up by him on the basis of the latest information and statistics possessed by the Financial Commissioner's office, gives the following figures :—

	<u>Acres.</u>	<u>Rate per</u> <u>Acres.</u>	<u>Outturn in</u> <u>tons.</u>
Food crops -	18,500,000	644 lbs.	5,488,240
Non-food crops -	2,600,000		

With regard to the food crops, it is perhaps best to accept Major Wace's figures as being specially prepared by an expert, with an express view to the discussion of this subject; whereas Mr. Thornton's figures were apparently taken from Administration Reports and, though official, had been less carefully considered. Major Wace gives no estimate of the value of non-food crops. Mr. Thornton's estimate comes to Rs. 21-10 per acre, or Rs. 56,160,000 in all; and this seems to me low. I shall make some remarks on the details as they come under discussion in the course of this note.

10. The next point is, the quantity consumed for food. Mr. Thornton's estimate (derived apparently from the jail ration) of the annual quantity consumed per head on an average of the whole rural population is as follows:—

Dry grain, including pulses	-	-	465 lbs.
Meat	-	-	15 "
Vegetables	-	-	66 "
Spices and condiments	-	-	4 1/4 "
Ghi and buttermilk	-	-	4 1/4 "
Milk and curds	-	-	15 "
Tobacco	-	-	4 "

The estimate of 465 lbs. of dry grain seems to me rather low when it is considered—(1) that there is loss on all grains and much loss in the case of the smaller millets in converting them to flour; (2) that a great portion of the rural population are engaged in hard work in the open air, and are therefore always hungry, and are well enough off to satisfy their appetites; (3) that the Punjabi is generally a big man, and eats more than an average Hindustani; but it agrees closely with the calculation of Major Wace and the Punjab Government, which place the consumption at 20 oz. per head per diem; and I do not therefore propose to raise it. The quantity consumed by the 18 millions will at this rate be 3,736,000 tons. The seed-grain is calculated by Major Wace to be 402,000 tons. The loss by wastage and dryage is estimated at 5 per cent. on the total produce, or 274,400. The consumption by cattle is a point on which very little is known with exactitude. Major Wace remarks on it as follows:—

"The agriculturists do not usually feed their cattle with grain, but the townspeople do, to a certain extent, especially their cows. The drivers of bullock carts always feed their cattle with two or three seers

of grain, when working. Bullocks, ponies, and mules are similarly fed when carrying pack-loads. And there is a certain very limited consumption in feeding up cattle and sheep for slaughter. It is difficult to put the consumption, under these various heads, as less than 6,000,000 maunds per annum, of which two-thirds is consumed by draught and pack cattle."

This calculation must be accepted for want of a better; but as part of the cattle thus fed belong, as already mentioned, to townspeople, I roughly set down the consumption of the rural cattle at 5,000,000 maunds, or 183,800 tons. The account with the dry grain or food-crop produce will therefore stand thus:—

Total outturn	-	-	-	Tons.	5,488,240
<i>Deduct—</i>					
				Tons.	
Food of people	-	-	3,736,000		
" of cattle	-	-	183,800		
Seed-grain	-	-	402,000		
Wastage	-	-	274,400		
					<u>4,596,200</u>
Surplus	-	-	-	-	<u>892,000</u>

The value of this surplus, taken at Mr. Thornton's average market rate, or Rs. 58 per ton, is Rs. 5,17,36,000.

The surplus is accounted for thus :—

	Tons.
Food of the urban population at the same rate as the rural	415,000
Food of cattle belonging to them	36,700
Average exports	166,000
	617,700

leaving a difference of 275,000 tons unaccounted for. This is not a large quantity out of so vast a sum total as we are dealing with, being only 5 per cent. Moreover, the consumption of the townspeople has been reckoned as only equal to that of the villagers, whereas it is known to be considerably greater. In the North-Western Provinces it is estimated at 7 maunds a head, or 500,000 tons for the urban population. Allowing a margin for slight errors, the value of the surplus crops to the rural population may be set down as fifty millions of rupees.

11. *Meat*.—The next item in Mr. Thornton's list is meat. Under the conditions of the problem as now put, we need not enter into the value of the meat raised and consumed by the rural population; we have only to do with what they sell to the townspeople. Mr. Thornton calculates that these latter consume 15 lbs. a head per annum, and that it costs them 2d. per lb. Then, the 2 million townspeople consume 30 million lbs. of meat, most, though not quite all, of which they buy from the rural population, and they pay for it 2½ million rupees. But a large portion of this is the price paid for the butcher's labour. The actual price paid to the grower* is probably about two-thirds of the price of the meat; so that the rural population can only be credited with ⅔ million of rupees as the money-proceeds of the cattle they sell for slaughter.

12. *Vegetables*.—Mr. Thornton's paper gives the area cultivated with garden vegetables as 200,000 acres; the average crop as 6,000 lbs. or 75 maunds per acre, and the value as Rs. 40. Major Wace gives the area as 250,000 acres, but he adds no estimate of produce. Mr. Thornton's estimate of produce seems me rather large. In the North-Western Provinces,

* The Punjab reply to the *Questionnaire* of the International Statistical Congress gave the average estimated weight of a sheep when slaughtered as $13\frac{1}{2}$ seers. Now the price paid for sheep varies probably from Re. 1 to Rs. 1-8, or say $1\frac{1}{2}$ annas per seer, or $1\frac{1}{2}$ p. per lb.

where the cultivation is, generally speaking, higher than in the Punjab, Mr. Buck puts it at 50 maunds, except in the case of potatoes, for which he allows 100 maunds per acre. The total produce of 250,000 acres would be, at Mr. Thornton's rate, 1,500 million lbs.; 20 million people at 66 lbs. a year would consume 1,320 million lbs. As there is hardly any provincial export of such perishable articles, the crop produced must approximately equal the consumption; so the one ought to be raised to 75 lbs. per head per annum, or the other lowered to 5,300 lbs., or 66 maunds per acre. In either case, all that we have to deal with is the quantity sold by the rural to the urban population. At 66 lbs. per head, this would be 132 million lbs., valued at Rs. 8,80,000; in the other case, at 75 lbs. per head, it would be 150 million lbs., valued at Rs. 10,00,000. In such a calculation as the present one, the difference is not very important.

13. *Spices and condiments*.—Mr. Thornton's area under spices and condiments is 200,000 acres, the estimated produce 500 lbs. per acre, and the value Rs. 40 per acre, or 12½ lbs. per rupee. Major Wace's area agrees with the above. Of these articles, there appears to be no net export in ordinary years, and the provincial consumption should equal the production. Mr. Thornton's rate of 4½ lbs. per head per annum gives a total consumption of 85 million lbs. for the province, while the production is 100 million lbs. But there is good reason, from general knowledge of their habits, for thinking that the townspeople consume spices and drugs to a much greater extent than the country people. Moreover, the municipal statistics of the North-Western Provinces have led that Government to the conclusion that the annual urban consumption of these articles is in value from Re. 1 to Rs. 1-4 per head, so that it is a moderate estimate to put it at 12 lbs. per head. We should have then—

18 millions @	4½ lbs.	-	76½ million lbs.
2	"	"	12
"	"	"	24
"	"	"	"

which exactly accounts for the estimated production. The value of the 24 million lbs. sold by the rural to the urban population is 2 million of rupees.

14. *Ghi and milk*.—Mr. Thornton estimates the consumption of ghi to be 4½ lbs. a year for agriculturists, but he states that the town consumption is 8 lbs. as shown by the octroi returns, and this figure agrees almost exactly with that of the North-Western Provinces municipalities. The townspeople therefore require 16 million lbs., valued at 4 million rupees. Mr. Thornton states that the provincial net imports of ghi are worth 8 million of rupees. If so, the conclusion would be that the rural population not only do not sell any ghi to the town, but require to buy some for their own consumption ; and this is hardly credible. The Annual Administration Report for 1877-78 (page 115) states the total value of ghi imported for the three previous years at Rs. 13,13,000, and the total value exported at Rs. 19,68,000, which gives an annual net export of Rs. 20,00,000 worth. Assuming that these figures are correct, and that Mr. Thornton has made a slip, the rural population make Rs. 40,00,000 from the townspeople and Rs. 200,000 from exports, total Rs. 42,00,000 by their ghi. Of milk, at Mr. Thornton's estimate of 15 lbs. a head, the town require 30 million lbs., worth a little less than one million of rupees.

15. *Tobacco*.—Mr. Thornton puts the area cultivated with tobacco at 74,000 acres, the average produce at 1,000 lbs. per acre, and the price at 37 lbs. per rupee, or less than Rs. 30 per acre. This is much below the North-Western Provinces' estimate. At the rate of 4 lbs. per head, the consumption of the province is 80 million lbs., while the out-turn is only 74 millions. The North-Western Provinces' estimate of urban consumption is 8 lbs. per head. Mr. Thornton states that some tobacco is imported (the Annual Report states it as 3,200,000 lbs. per

annum), and that the Jat Sikhs do not smoke, but they are only 6·5 per cent. of the entire population.* Taking the North-Western Provinces' rate, the townspeople consume 16 million lbs., worth rather less than half a million of rupees. Deducting the import from this, we may put the amount sold by the rural population at 13 million lbs., value Rs. 3,50,000.

16. *Sugar.*—Sugar is an item of consumption hardly touched on by Mr. Thornton, who alludes only to "occasional sweetmeats," which he includes among the head of miscellaneous. The North-Western Provinces' estimate of consumption is 30 lbs. of coarse sugar, and 10 to 12 of fine sugar per head of town population. The rural population buy very little fine sugar, but they make their own coarse sugar. The area under sugar-cane is put by Major Wace at 350,000, by Mr. Thornton at 374,000 acres; and the latter estimates the production at 1,600 lbs. per acre (600 million lbs. in all), worth 33 lbs. per rupee, or Rs. 48 per acre. This is very much below the North-Western Provinces' estimate (in Shah-jahanpur over 4,000 lbs. of "rab" is produced per acre), and is undoubtedly too low. At 30 lbs. per head, the whole produce, 600 million lbs., would be required for the use of the province in coarse sugar alone, leaving none for refining or for export. Ten lbs. of fine sugar are made from 30 lbs. of coarse, so that, if each person consumed at the rate of the North-Western Provinces' municipal estimate, they would require 1,200 million lbs. They do not, however, consume as much in the villages, but enough has been said to lead to the conclusion that Mr. Thornton's estimate of production is too low. But we are now concerned only with the urban consumption and the export. The two millions in the towns consume 60 million lbs. of coarse, and 20 million of fine sugar, or 120 million lbs. of coarse sugar, reducing the two kinds to a common denominator. The average net imports during the last three years† have been 14 million lbs. of refined, and 20 million lbs. of coarse sugar, which is equal to 62 million lbs. of coarse sugar. The net sales by the rural to the urban population are therefore 58 million lbs. of coarse sugar, worth a little less than two million rupees.

17. *Oil.* *Oil for lighting.*—This subject also is hardly touched by Mr. Thornton. The North-Western Provinces' municipal estimate of consumption is 4½ seers of oil; and, allowing that the village consumption is less, it may be put at four seers, or 8 lbs., of oil per head per annum, or 32 lbs. of oil-seeds, value about one rupee. The Punjab will therefore require 640 million lbs. of oil-seeds for its own use. It also exports this article largely, the average export* of the last three years being 970,000 maunds, or 77½ million lbs. The total production must therefore be about 720 million lbs. Adding on for seed-grain and wastage, the production must be 770 million lbs. But Mr. Thornton only credits it with 300 million lbs. grown on 720,000 acres. The explanation of this discrepancy is no doubt (as pointed out by Mr. Buck in his paper on the North-Western Provinces' production) that, in the majority of cases, oil-seeds are not grown by themselves, but mixed in small quantities with wheat and barley and other such crops. However, the townspeople take 64 million lbs. of oil-seed, and the export trade take 77½ million lbs.—total (say) 140 million lbs., worth 4½ million rupees, or Rs. 42,50,000 to the rural population who raise them.

18. *Clothing materials.* *Clothing.*—Mr. Thornton estimates that the cost of cotton and woollen clothing, and of shoes, comes to Rs. 2·72 a head for the agriculturist. Of this, about Rs. 2 goes for cotton clothing, 4 annas for woollen clothing, and 8 annas for shoes. But while the country people mostly wear native-woven

cloths, townspeople mostly wear English-woven cloth, and it is difficult to make an estimate of what the value is of cotton supplied to the town either for woven wear or for wadded quilts. Raja Lachman Singh's estimate for the North-Western Provinces was 3 lbs. 10 oz. of cotton, worth about Rs. 1–12 per head; and this included the urban poor—say half the urban population. Considering how much cotton is used for wadded clothes in the colder climate of the Punjab, it would not be perhaps excessive to adhere to this estimate, or, for safety's sake, we may put the consumption of native cotton by the townspeople at three lbs., or, say, at present prices, 8 annas a head.

As to the shoes, which Mr. Thornton prices at 8 annas, the rural population will only receive the price of the leather, or, say 4 annas, the rest being chargeable to workmanship; thus, for cotton, wool, and leather they will receive from the urban population 1 rupee a head, or 2 million of rupees. Besides this, there is an annual export of about 2 million rupees' worth of cotton, and the same value in wool, and about 3 millions of rupees' worth of hides and leather, of which perhaps two-thirds would be the price of the raw material. The total receipts of the rural population, therefore, from cotton, wool, and leather will be about 8 millions of rupees.

19. *Timber and Fuel.*—Mr. Thornton reckons that the timber imported into town is worth Rs. 22,00,000; and the fuel required for 2 million of people is worth 4½ million rupees. But this price includes the cost of labour in felling and splitting and of carriage, and a very small portion of it, I conceive, reaches the owner of the land on which the timber or wood grew. Adding in, as Mr. Thornton does, 4 million rupees for the price of timber used for public works and furniture, and fuel for locomotives, manufactories, &c., I should doubt if, out of the total 11 millions, 2 millions of rupees reached the producer.

20. *Indigo, Poppy, and Miscellaneous.*—There remain the three non-food crops, indigo, poppy, and "miscellaneous," which cover an area of 916,000 acres according to Mr. Thornton, 200,000 acres according to Major Wace; and the value of their produce is estimated at about Rs. 20 an acre. The rate is a fair one, and the value (adopting Major Wace's acreage) is 4 millions of rupees.

21. *Summary of Receipts.*—The receipts of the rural population from their surplus produce may then be summed up thus:—

	Rs.
Food crops	5,00,00,000
Meat	16,66,000
Vegetables	10,00,000
Spices and condiments	20,00,000
Ghi and milk	52,00,000
Tobacco	3,50,000
Sugar	20,00,000
Oil	42,50,000
Clothing materials*	80,00,000
Timber and fuel	20,00,000
Indigo, poppy, and miscellaneous	40,00,000
	8,04,66,000

Deducting 10 per cent. for the difference between village and market prices, the surplus amounts to 72 millions of rupees. This comes to Rs. 4 a head, or about Rs. 20 a family, if spread over the whole rural population. These profits, however, will accrue not to the labourers, shepherds, carpenters, &c., but for the most part to those who possess rights and interests in the land, and who number, as calculated in paragraph 3, about 13½ millions. Their profits will thus be about Rs. 5–8 a head, or Rs. 24 a family.

22. *Necessary Expenditure and common Luxuries.*

—There are only two items of necessary expenditure that have to be set against this income. The first is revenue and local cesses, which Mr. Thornton states

amount to 24 millions of rupees. The next is salt, which, at the jail ration (calculated as in page), is consumed at the rate of 9 lbs. per head, or 162 million lbs. per annum. This will cost them about 9 million rupees. There are two other sources of expenditure, the purchase of refined sugar, and of English-woven cloth, neither of which is, strictly speaking, a necessity, though they are so universally bought that they deserve to be taken into account. The English piece-goods imported (net) into the province are worth 34 millions of rupees a year. The town consumption of these at Rs. 6 a head is 12 million rupees, leaving 22 million rupees' worth to be used by the 18 million of rural population or more than Re. 1 per head; which seems a high estimate, though I have no other data to check it by.* For refined sugar, again, I know of no statistics to show the amount consumed by the rural population; but, as a mere guess, putting it at half the amount with which the town residents have been credited, or 5 lbs. a head, it amounts to 90 million lbs., or about 13 million rupees.

23. *Summary of Expenditure.—Balance struck.*—The expenditure on necessities not produced in the villages, and on common luxuries, and in taxes, is as follows:—

	Rs.
Land tax and cesses	2,40,00,000
Salt	90,00,000
Refined sugar	1,30,00,000
English cloth	2,20,00,000
	6,80,00,000

leaving only about four million rupees as surplus

profits from direct agricultural produce, available for savings, or for expenditure on other luxuries.

24. *Conclusion.*—I offer this estimate with the more diffidence because I have no local knowledge of the Punjab, and because I have ventured to differ in some respects from so distinguished an authority as Mr. Thornton. If my method is an unsound one, I have no doubt its error will be exposed by the criticism to which it will be subjected; if it is sound, I trust that those who have the local knowledge, which I do not possess, will assist me, by correction of any erroneous details, to work out a fairly accurate calculation of the economic condition of the rural population of the Punjab.

25. The difference between the outcome of our two calculations is this: Mr. Thornton takes the agricultural population at 11 millions, and attributes to them a profit of 140 million of rupees. I take the rural population at 18 millions, and attribute to them a profit (after paying for necessities and taxes) of 39 millions of rupees, derived solely from the land, over and above the profit derived from other occupations which a large portion of them pursue side by side with agriculture; and out of that 39 millions I reckon that 35 are spent on common luxuries, leaving only four for hoarding. The margin is no doubt a small one, but the estimate provides amply for all the necessities of life, and there must be a considerable profit for the larger landowners when the whole rural population can be shown to be well supplied with the means of living.

* Except an inquiry made by Mr. Moens in Bareilly, who found that 430 agricultural persons bought Rs. 243 worth of English cloth in the year. This is hardly 8 annas a-piece. (Settlement Report, page 50).

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The land revenue of the North-Western Provinces and Oudh is assessed on each village, and is fixed for a period of 30 years. The fixing of the land revenue is a settlement. The first 30 years' settlements were carried out generally between 1835 and 1840; and the revision of these settlements for a second period of 30 years began about 1860, and though finished in most districts, is still going on in four. In Oudh the settlement was taken in hand shortly after the Mutiny of 1857 had subsided, and it was concluded, with the exception of some revising operations, about 1877.

2. The principle of the first 30-year settlement in the North-Western Provinces was that Government was entitled to take as its share ⅓rds of the gross average rental of the land, leaving to the landowners ⅔rd of the rental, besides the ordinary profits of cultivation. But in 1854 the general standard of comfort had risen so much, and the opinion prevailed so widely that it was for the good of the country that a larger margin of profit should be left to the landowners, that the Government of the time decided to lower the land revenue at the next assessment to 50 per cent. of the gross rental. But still the increase in the cultivated area had been so large between 1840 and 1870, and the rise in rents due to higher prices and to increased competition so considerable, that in most districts the half of the rental of 1870 has proved to be more than two-thirds of that of 1840.

3. In estimating the gross average rental of a village, the main duty of the Settlement Officer is to ascertain the actual facts; that is, to find out what rents are really paid by cultivators to landlords, and, by applying similar rates to lands which are not rented but are held as home farms, let at low rates to relations, &c., to calculate what sum of money the whole estate would bring in if it were all rented. A good deal of land is rented below its real value, from reasons which belong to the past history of the village and the relations between landlord and tenant in

former times. The Settlement Officer has to estimate what would be a fair rent on such lands, and he does this by classifying the soil according to its qualities and productive powers, and by ascertaining, over large tracts of homogeneous land, what rates of rent cultivators pay on an average on each class of soil where no special causes for leniency exist. In this way the full average rental of a village or an estate is calculated; and whether the landlord collects the whole of that sum as rent, or is pleased to remit any portion of it to the tenants or others, half of it is taken by the Government as land revenue.

4. The table below shows for the North-Western Provinces the difference between the old and new assessment, as far as the latter had been made on 30th September 1878, and for all districts the incidence of the land revenue on the cultivated area. The incidence on different classes of soils need not be stated here. It will be found in the settlement report for each district; and a large collection of the rates is given in pages 40–62 of the appendices to Mr. A. Colvin's "Memorandum on the revision of land revenue settlements in the North-Western Provinces" (1872). The classification of land is too various and complicated to convey any meaning, except to the mind of an expert. Speaking very roughly, however, the following figures may be mentioned as shewing the rates at which the land revenue falls on the more ordinary classes of the soil:—

	Rs. per acre.
Good land near the village site, highly manured and irrigated	4 to 6
Good land at a little distance from the site manured occasionally and irrigated	2 to 4
Good outlying land, irrigated	1½ to 3
Good unirrigated land, at a little distance from the site, occasionally manured	1 to 2
Good outlying land, unirrigated	1
Sandy ditto ditto	¼ to ½

* Census Report, paragraph 28.

† Administration Report for 1877–78, page 115.

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In the suburban lands of large towns, Rs. 10 or 12, and even Rs. 20, per acre would not be an excessive rate of assessment.

DISTRICTS.	Former assessment.	Present assessment.	Rate per cultivated acre.
NORTH-WESTERN PROVINCES.	Rs.	Rs.	Rs. A.
Dehra Dun - - -	40,200	63,422	0 15
Sabarunpur - - -	10,22,531	11,74,161	1 9
Muzaffarnagar - -	11,34,174	12,22,726	1 14
Meerut - - -	17,94,616	21,23,929	2 1
Bulandshahr - - -	11,07,796	12,38,363	1 11
Aligarh - - -	18,48,575	21,38,756	2 6
Kumaun - - -	1,26,886	2,35,146	1 4
Gurhwal - - -	68,180	96,186	0 14
Bijnor - - -	11,82,005	11,83,453	2 0
Moradabad* - - -	9,13,213	14,33,409	1 13
Budaun - - -	9,28,475	10,36,465	1 3
Bareilly - - -	17,00,909	20,50,079	1 12
Shahjahanpur - - -	9,75,270	11,81,654	1 13
Muttra* - - -	11,19,655	15,95,409	2 8
Agra - - -	10,47,091	20,15,262	2 3
Farukhabad - - -	11,25,342	12,32,874	1 13
Mainpuri - - -	11,19,524	12,65,831	2 1
Etawah - - -	11,94,999	13,26,704	2 10
Etah - - -	7,32,460	9,22,245	1 8
Jalaun - - -	8,75,970	9,15,035	1 11
Jhansi - - -	5,89,097	4,48,507	1 2
Lalitpur - - -	1,66,255	1,49,055	0 12
Cawnpore - - -	21,30,405	21,58,240	2 8
Fatehpur - - -	14,05,815	13,07,505	2 7
Banda* - - -	—	13,01,295	1 10
Allahabad - - -	16,83,247	23,67,547	2 6
Hamirpur* - - -	—	10,80,532	1 8
Jaunpur - - -	—	12,48,119	2 2
Gorakhpur - - -	20,65,305	16,84,388	1 1
Basti - - -	—	13,19,470	1 2
Azamgarh* - - -	12,99,012	18,96,386	2 2
Mirzapur - - -	—	8,43,395	1 0
Benares - - -	—	8,96,290	1 15
Ghaziipur - - -	—	15,15,672	1 8
Total for N.-W. P. -	—	4,28,94,255	1 12 2
OUDH.			
Lucknow - - -	—	7,82,578	2 5 9
Unao - - -	—	13,48,539	2 3 6
Bara Banki - - -	—	15,74,659	2 5 6
Sitapur - - -	—	13,23,452	1 6 10
Hardoi - - -	—	13,73,297	1 9 11
Kheri - - -	—	9,35,991	1 3 9
Fyzabad - - -	—	11,65,435	1 14 9
Bahraich - - -	—	9,67,575	1 2 2
Gonda - - -	—	15,38,805	1 7 0
Rae Bareli - - -	—	12,88,877	2 5 5
Sultanpur - - -	—	12,00,147	2 1 8
Partabgarh - - -	—	9,84,687	2 3 4
Total for Oudh -	—	1,44,84,042	1 12 3

N.B.—The districts marked * were still under assessment in 1878.

5. These settlements have been made with great care and elaboration by a picked set of officers selected as being the most capable of the younger members of the civil service; and there can be no doubt that on the whole the assessments fixed by them do accurately represent a fair half of the gross average rental. Some, no doubt, are lighter, and some heavier; the most questionable cases are either those where rent is taken in kind and an estimate of its average money-value has to be formed, or else where the crops vary so violently with the fluctuations of the seasons that the average is peculiarly hard to strike. But, on the whole, the incidence is acknowledged both by the collectors of the districts and by the best informed native gentlemen to be fair and equitable, and the revenue is collected with ease and punctuality.

6. The proportion borne by the land revenue to the estimated value of the annual gross produce was shown in the discussion of question 3 to be about 13 per cent., or between $\frac{1}{4}$ and $\frac{1}{3}$.

7. The following principles have been prescribed for fixing the dates at which instalments of revenue are payable:—that the cultivator should not be bound to pay his rent until a little time has elapsed after his main crops have become ripe, so as to allow him to sell in an open and not a forced market a portion of that crop; and that a month after the landowner can demand rent from the cultivator, the revenue should become due from him to Government. If the date is fixed too early, *i.e.*, before the crop is ripe or is harvested, the cultivator has no cash in his hands, and is forced to borrow. If it is fixed too late, an improvident cultivator may be tempted to dispose of his cash before the landowner comes to demand it. It is necessary to choose a judicious medium between these two errors.

8. Another consideration to be borne in mind is this,—that the rent ought to be paid as far as possible out of crops which the cultivator sells, not out of those which he would naturally keep for his own consumption. The rain-crops which ripen earliest, such as the light coarse millets, the coarser rice, and the Indian corn, are almost entirely grown for home-consumption, and, broadly speaking, all the rain-crops (except indigo and cotton) are grown for food rather than for sale, and a much smaller proportion of these than of the spring crops (wheat and barley) comes into the market at all.

9. The cultivator receives more cash, therefore, in the spring than in the autumn, besides which he has also to buy seed in the autumn at the rate of about 100 lbs. to the acre for the winter crops. It follows, therefore, that for the autumn rent the cultivator has more occasion to borrow than for the spring rent, unless due consideration has been made in fixing the instalment. When a proper arrangement has not been made, it generally occurs that the cultivator has to borrow not only money for rent, but grain for seed. Money is lent at half an anna per rupee per month, which is equivalent to 37½ per cent. per annum. Seed is borrowed at different rates. Sometimes it has to be repaid in kind *plus* 50 per cent., so that if a cultivator borrows 10 maunds in October, he must return 15 in April; sometimes the *value* of the seed-grain has to be repaid with 50, or more commonly with 25 per cent. additional, at harvest, and the lowest rate of interest ever charged is half an anna per rupee per month. Grain at sowing time is always dearer than at harvest time; so that if 10 maunds are lent in October when grain fetches (say) Rs. 3 a maund and returned in April when grain fetches (say) Rs. 2 a maund, the cultivator has to pay 15 maunds, worth Rs. 30, *plus* interest, Rs. 5–10, to clear off his debt. Everything ought to be done, therefore, to prevent the cultivator being thus mulcted.

10. So far the question has been treated with regard only to cultivators' interests. But financial interests are also much concerned. If at one season a very large tract of country is called upon to supply the Government treasuries with hard cash, there is a sudden demand for silver coin which drains the market and affects circulation. The cash is meanwhile locked up and doled out month by month in payment of the various military and civil establishments of the country. It would therefore be convenient, from a financial view, that collections should be made at different dates in different parts of the same district, and this is what would occur if homogeneous tracts and villages were in practice treated as the settlement rules intended that they should be treated.

11. Mr. Buck gives the following examples to illustrate the way in which the instalments can be brought into relation with the crops:—"The crops of a village A being divided into crops eaten by cultivators and crops sold, it is found to sell on an average Rs. 800 of rice in August, and Rs. 1,200 of sugar in January, and to eat the rest. The most convenient arrangement would be to require rent to be paid in the following proportions:—

Charged against rice - - 40 per cent., 15th Sept.
Ditto sugar - - 60 " " 15th Feb.
Suppose another village, B, is found to sell Rs. 1,000 worth of indigo and cotton in October and November, and Rs. 1,000 worth of wheat and oil seeds in March and April, the arrangement might be—
Charged against indigo - 20 per cent., 1st Nov.
Ditto cotton - 20 " " 1st Dec.
Ditto wheat and oilseeds - 60 " " 1st May.

12. It is evident, however, from the replies sent in from the different districts that as yet these principles have not been effectually carried out. This has been due, partly to the difficulty of ascertaining the individual necessities of each village, partly to the fact that the principle above enunciated was only laid down in 1874, when most of the settlements had been completed. The previous system had rather been in the direction of treating both landowners and cultivators as children, assuming that the money would burn a hole in their pockets, and that it must be collected from them almost before they had got it, certainly not a day after. The instalments have now, as a general rule, been put back, so as to give everyone a better opportunity of realising a fair market-price; but they are still too uniform, and instead of varying with every village, or at least every homogeneous tract of country, they are often fixed for identical dates throughout a whole district, although it may consist of very distinct tracts, growing different kinds of crops, which ripen at different seasons.

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13. *Incidence of Land Revenue, &c.*—The general incidence of land revenue on the cultivated area, estimated as explained in the answer to question 3, is shown in Statement I. district by district. The incidence on different classes of land cannot be given; nor is the amount of their gross produce known with anything approaching to accuracy. The figures in columns 3 and 5 have been worked out in accordance with the general plan of this report; but it cannot be too often repeated that they possess *per se* no statistical value whatever. Bengal and Behar being permanently settled under the Regulations of 1793, no re-adjustment of the land revenue, however desirable it might be, is possible. The settlement of Orissa expires in 1879. Of late years there has never been any practical difficulty in realising the land revenue in Bengal, nor in Orissa, except during the years following the famine, when Rs. 15,84,391 were remitted, the condition of the remission being that the zamindars should give a corresponding remission of rent to their ryots. It would be strange, indeed, if it were not so, considering the difference between the amount of the Government demand on, and the gross rental of, the land in Lower Bengal. The following figures exhibit this difference in a very striking light. The figures for "rental" include rental of revenue-free and of some of the rent-free lands which are not exhibited separately in the returns. Fuller details will be found in Statement II.

DIVISION.	Government Revenue (per Year of Valuation).	Gross Rental.
	Rs.	Rs.
Burdwan - - -	79,74,891	1,85,40,026
Presidency - - -	51,16,523	1,42,35,364
Rajshahye - - -	48,65,840	1,59,30,574
Dacca - - -	39,71,399	1,91,25,288
Chittagong - - -	12,43,749	59,58,881
Patna - - -	80,26,164	3,73,48,552
Bhagulpore - - -	31,60,941	1,15,05,324
Orissa - - -	17,36,845	40,19,130
Chota Nagp - - -	3,01,102	37,15,796
Total - - -	3,63,97,454	13,03,78,935

13. Another reason why collectors have made no objections to the existing arrangements is this, that the person with whom the collector has to deal being the landlord, the main difficulty does not present itself to him. Landlords, as a body, are only too glad to pay under a system which is inconvenient to the tenant and which gives them, the landlords, firstly, the opportunity of charging interest on arrears of rent, which interest never forms part of a recorded rental, and is, therefore, never charged with revenue; secondly, the opportunity of ejecting tenants who cannot pay, and of thus destroying their occupancy rights. Under these circumstances, it is natural that landlords should not object to the old system of fixing the instalments too early, and should not specially desire the introduction of the new system.

14. Mr. McConaghey, Collector of Banda, remarks that he "would certainly advocate that both the dates " and the proportions of the instalments should be " settled after consideration of the special and " general circumstances of each village, and should " not, except the circumstances are precisely the " same, be uniform for considerable areas." This view embodies the principles laid down in the settlement rules. What is now necessary is that each collector should be required by the local rules under the Act to make such alterations in the dates and amounts of the instalments as now fixed as will meet the circumstances of each part of his district which requires different treatment from any other part.

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No stronger argument than the above figures could be brought forward to show that State expenditure in times of scarcity should be resorted to as seldom and as sparingly as possible. The difficulty lies in the attempt to place the burden on the right shoulders.

The instalments of revenue, which are *due* according to the original agreements made at the time of the permanent settlement, are now *payable* only on the following dates, without reference to the time of harvest:—

In Bengal, 12th January, 28th March, 28th June, and 28th September.

In Behar, 12th January, 28th March, 7th June, and 28th September.

In Orissa, 28th April, 8th November.

In the Chittagong district there are five kists, and in Darjeeling and all the districts of Chota Nagpore, where the sunset sale law (Act XI of 1859) is not in force, there are no fixed dates for payment, except such as are specified in the landlord's agreement. It is the above fixed dates of payment which now chiefly regulate the collections of rent by landlords.

No interest is charged on arrears of land revenue. The unrelenting nature of the Government revenue demand, without reference to the goodness or badness of season, although it does not now lead to wholesale transfers of landed property, yet may have the evil effect of making both the poorer land-owning and the cultivating classes to some extent dependent on the money-lending classes. The high interest charged by these latter renders it difficult for their debtors, even in a good season, to extricate themselves from the debts incurred in a bad one, and when two or more bad seasons follow one another they become involved.

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STATEMENT I.

STATEMENT showing the INCIDENCE OF LAND REVENUE ON CULTIVATED AREA, SALES OF ESTATES, PRICES OF LAND AND LABOUR, &c.

Division.	District.	Cultivated area in acres.	Land Revenue (current demand for 1876-77).	Incidence of Land Revenue on cultivated area.	Average Price of Land per Acre (as given by District Officers).	Land sold for Arrears of Revenue (Average of last Three Years).	Wages usually paid to Field Labourers.
1.	2.	3.	4.	5.	6.	7.	8.
Burdwan	Burdwan	2,009,680	Rs. 33,54,440	Rs. A. P. 1 10 8	Rs. 150	28	Rs. 37,681
	Bankoora	423,000	2,08,708	0 7 11	—	3	752
	Beerbhoom	566,400	7,26,385	1 4 6	40	2	8,669
	Midnapore	2,309,000	22,68,877	0 15 9	26	14	26,968
	Hooghly and Howrah.	818,750	12,81,502	1 9 1	66 to 70	18	20,761
Presidency	24-Pergunnahs.	1,036,485	17,18,031	1 10 6	30 to 150	11	19,024
	Nuddea	1,063,720	10,43,981	0 15 8	15	12	4,766
	Jessore	1,784,300	10,79,728	0 9 8	30 to 40	11	2,207
	Moorshedabad.	989,000	14,14,501	1 6 10	40	21	10,246
Rajshahye	Dinagepore	1,689,000	16,69,063	0 15 9	45	2	15,235
	Rajshahye	886,866	9,32,970	1 0 10	45 to 60	3	2,498
	Rungpore	1,934,000	9,84,251	0 8 1	—	2	31,955
	Bogra	964,040	4,02,630	0 6 8	60	1	645
	Pubn	439,842	3,84,014	0 14 0	15	7	3,170
	Darjeeling	—	77,643	—	10 to 15	—	—
	Julpigoree	350,719	2,99,118	0 13 8	40	—	—
Dacca	Dacca	1,296,513	4,87,116	0 6 0	50 to 70	19	98,154
	Furreedpore	704,640	5,00,988	0 11 4	60	13	2,043
	Backergunge	2,406,634	13,08,897	0 8 8	57	5	2,086
Chittagong	Mymensingh	1,430,464	8,68,733	0 9 9	101	11	4,363
	Tipperah	1,270,649	10,07,681	0 12 9	60 to 70	7	1,615
	Chittagong	544,640	6,71,031	1 3 8	49	274	1,19,690
	Noakholly	703,140	4,60,478	0 10 5	40 to 80	4	2,880
Patna	Patna	1,163,153	14,85,472	1 4 5	80	4	11,756
	Gya	1,728,000	13,66,924	0 12 7	100	2	5,337
	Shahabad	1,690,000	17,47,619	1 0 6	60	10	68,502
	Durbhunga	2,049,009	4,98,371	0 3 10	100	24	96,594
	Mozufferpore	1,816,000	12,14,867	0 10 8	60	—	—
	Sarun	2,320,000	12,24,242	0 8 5	100 to 120	4	6,191
	Chumparun	1,437,000	5,11,442	0 5 8	60 to 70	—	—
Bhagulpore	Monghyr	1,952,000	8,58,343	0 7 2	150	12	29,861
	Bhagulpore	2,835,961	5,64,935	0 3 2	50 to 80	11	19,367
	Purneah	1,586,357	11,22,012	0 11 4	40	11	2,143
	Maldah	442,622	4,04,082	0 14 7	15 to 20	6	5,572
	Sonthal Pergunnahs.	815,207	2,18,877	0 4 4	48	—	—
Orissa	Cuttack	1,350,000	8,65,509	0 10 3	75 to 85	4	18,614
	Pooree	664,320	4,75,564	0 11 10	46	2	2,603
	Balasore	583,259	4,11,531	0 11 4	35	4	387
Chota Nagpore.	Hazareebagh	1,318,912	1,15,088	0 1 5	5 to 20	—	—
	Lohardugga	2,823,738	1,10,376	0 0 8	40 to 60	—	—
	Singbhoom	635,648	54,517	0 1 5	28	—	—
	Manbhoom	1,812,800	88,250	0 0 9	30 to 60	—	—
	Total	54,645,468	3,64,88,787			562	6,82,335

STATEMENT II.

STATEMENT showing the AREA, POPULATION, LAND REVENUE, and ROAD CESS VALUATION of all ROAD CESS DISTRICTS.

CHAP. I. QN. 13.

BENGAL.

Mr. Toynbee.

Division.	District.	Area in square miles.	Population.	Land Revenue of year of Valuation.	Rental as per Road Cess Valuation.
				Rs.	Rs.
Burdwan	Burdwan	3,455	2,034,745	33,54,440	74,94,099
	Bankoora	1,422	526,772	2,06,965	6,96,978
	Beerbhoom	1,344	695,921	7,37,900	16,14,177
	Midnapore	5,082	2,545,179	22,15,611	57,26,011
	Hooghly (with Howrah)	1,467	1,488,556	14,59,975	30,08,761
	Total	12,770	7,291,173	79,74,891	1,85,40,026
Presidency	24-Pergunnahs	2,788	2,210,047	16,73,989	43,76,798
	Nuddea	3,421	1,812,795	10,41,852	27,50,647
	Jessore	3,658	2,075,021	10,50,393	38,28,090
	Moorshedabad	2,462	1,353,626	13,50,289	32,79,829
	Total	12,329	7,451,489	51,16,523	1,42,35,364
Rajshahye and Cooch Behar.	Dinagepore	4,126	1,501,924	17,12,844	33,01,980
	Rajshahye	2,234	1,310,729	10,33,524	34,08,969
	Rungpore	3,476	2,149,972	9,98,758	46,41,644
	Bogra	1,501	689,467	4,05,159	12,57,981
	Pubna	1,978	1,211,594	3,71,102	15,14,735
	Darjeeling	1,234	94,712	71,008	5,29,163
	Julpigoree	2,906	418,665	2,73,445	12,76,102
	Total	17,455	7,377,063	48,65,840	1,59,30,574
Dacca	Dacca	2,796	1,852,993	4,92,775	22,49,524
	Furreedpore	2,249	1,511,878	3,31,038	12,01,030
	Backergunge	3,648	1,878,144	13,10,505	69,59,267
	Mymensingh	6,229	2,349,917	8,33,869	51,55,085
	Tipperah	2,460	1,533,931	10,03,212	35,60,382
	Total	17,452	9,126,863	39,71,399	1,91,25,288
Chittagong	Chittagong	2,322	1,127,402	6,71,031	30,32,345
	Noakholly	1,852	713,934	5,72,718	29,26,536
	Total	4,174	1,841,336	12,43,749	59,58,881
Patna	Patna	2,101	1,559,638	14,02,982	57,90,154
	Gya	4,716	1,949,750	13,72,870	70,44,015
	Shahabad	4,385	1,723,974	17,48,202	56,52,208
	Durbhunga	3,004	2,196,324	5,48,662	63,19,138
	Mozufferpore	3,335	2,188,382	12,17,904	44,15,325
	Sarun	2,654	2,063,860	12,20,679	55,06,769
	Chumparun	3,531	1,440,815	5,15,065	26,20,943
	Total	23,726	13,122,743	80,26,164	3,73,48,552
Bhagulpore	Monghyr	3,922	1,812,986	8,46,381	33,79,596
	Bhagulpore	4,268	1,826,290	6,85,560	43,09,309
	Purneah	4,957	1,714,795	12,29,335	28,59,695
	Maldah	1,813	676,426	3,99,665	9,56,724
	Total	14,960	6,030,497	31,60,941	1,15,05,324
Orissa	Cuttack	4,513	1,622,584	8,47,401	21,07,442
	Pooree	2,472	769,674	4,85,345	10,41,445
	Balasore	2,068	770,232	4,04,099	8,70,243
	Total	9,053	3,162,490	17,36,845	40,19,130
Chota Nagpore	Hazareebagh	7,021	771,875	1,10,343	10,47,847
	Lohardugga	12,044	1,237,123	1,02,559	14,87,154
	Manbhoom	4,921	995,570	88,200	11,80,795
	Total	23,986	3,004,568	3,01,102	37,15,796
	GRAND TOTAL	135,905	58,408,222	3,63,97,454	13,03,78,935

Note.—The figures in the last two columns are taken from the Board's valuation completion reports to Government.

CENTRAL PROVINCES.

Incidence of Land Revenue.—At the time of settlement, owing, perhaps, to the paucity of irrigation, the assessments were fixed by a classification of soils, and no distinction was made between irrigated and dry cultivated lands. Nor can I now attempt to show separately the incidence of the land revenue on such different classes of land.

The following statements (A.) and (B.) show the incidence of the land revenue on the cultivated lands,

and on the culturable malguzari lands, and its proportion to the gross produce calculated on the present cultivated area,* valued, *first*, at the rates prevailing at the settlement time, and, *secondly*, at the rates of the present day.

* See statement of area of cultivation under Group 3, page 104.

(A.)—STATEMENT SHOWING LAND REVENUE, ACREAGE RATES, and VALUE OF GROSS PRODUCE at Time of Settlement.

Districts.	Value of Food Grains.	Value of Oil-seeds.	Value of Sugar-cane.	Value of Cotton.	Value of other crops.	Total value of produce.	Total Land Revenue assessed.	Average rate per acre.		Proportion the Land Revenue bears to value of gross produce.
								On cultivated lands.	On culturable including cultivated lands.	
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs. a. p.	Rs. a. p.	
Nagpur	42,73,061	5,74,449	66,240	18,06,735	2,19,380	69,39,765	8,30,313	0 13 5	0 9 3	One-8th
Bhandara	43,94,715	1,47,054	3,43,960	360	56,170	49,42,269	4,04,013	0 7 11	0 4 5	One-12th
Chanda	38,11,551	2,57,817	2,39,840	5,44,950	1,28,040	49,82,198	2,50,072	0 5 9	0 1 1	One-20th
Wardha	28,46,467	4,62,684	27,560	33,36,315	80,670	68,53,696	5,12,345	0 9 1	0 7 6	One-12th
Balaghat	25,05,773	73,731	94,520	—	19,950	22,73,974	1,59,217	0 5 5	0 3 5	One-17th
Upper Godavari	1,14,540	5,139	240	9,525	2,520	1,21,934	19,968	0 13 8	0 5 7	One-6th
Jubbulpore	55,84,163	2,74,086	82,280	3,38,475	51,860	63,30,864	5,79,226	0 8 11	0 6 8	One-11th
Saugor	43,59,576	1,92,795	1,62,080	4,25,760	87,190	52,27,401	4,39,187	0 8 11	0 5 0	One-12th
Damoh	21,50,053	1,17,152	35,080	1,91,820	50,840	25,44,945	2,66,324	0 9 9	0 5 4	One-10th
Seoni	34,80,313	2,07,633	42,020	1,40,040	36,550	39,06,856	1,49,403	0 3 9	0 2 7	One-26th
Mandla	23,50,859	61,850	25,200	9,855	31,470	24,79,224	93,567	0 3 7	0 3 11	One-36th
Chhindwara	28,79,642	1,99,329	3,81,720	6,13,920	27,500	41,02,111	2,19,565	0 6 0	0 3 3	One-20th
Hoshangabad	40,77,928	1,99,800	4,55,000	3,54,585	4,09,020	54,55,533	4,28,115	0 7 5	0 6 0	One-12th
Narsinghpur	32,11,989	26,664	95,360	8,23,890	45,280	42,03,183	4,21,810	0 10 11	0 8 10	One-10th
Betul	31,57,503	1,77,141	3,43,080	33,135	80,130	37,90,989	1,96,015	0 4 6	0 2 4	One-20th
Nimar	15,67,050	96,993	11,560	5,74,080	48,600	22,98,343	1,78,847	0 6 0	0 4 9	One-13th
Raipur	92,98,126	5,55,486	13,22,360	12,38,205	5,34,680	1,29,47,857	5,45,209	0 3 7	0 1 9	One-24th
Sambalpur	36,08,520	3,19,998	1,95,000	7,47,405	1,15,190	49,86,103	1,16,834	0 1 4	0 1 0	One-42nd
Bilaspur	34,15,886	2,01,300	4,20,800	8,47,500	—	48,85,486	2,64,314	0 3 4	0 1 10	One-18th
Total	6,58,86,726	53,52,150	43,04,200	1,20,36,555	20,25,040	8,96,04,671	60,74,694	0 7 2	0 3 4	One-15th

(B.) STATEMENT SHOWING LAND REVENUE, ACREAGE RATES, and VALUE OF GROSS PRODUCE at the Present Time.

Districts.	Value of Food Grains.	Value of Oil-seeds.	Value of Sugar-cane.	Value of Cotton.	Value of other crops.	Total value of produce.	Total Land Revenue assessed.	Average rate per acre.		Proportion the Land Revenue bears to value of gross produce.
								On cultivated lands.	On culturable including cultivated lands.	
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs. a. p.	Rs. a. p.	
Nagpur	1,06,82,652	17,23,347	66,240	18,06,735	2,19,380	1,44,98,354	8,30,313	0 13 5	0 9 3	One-18th
Bhandara	90,09,165	4,41,162	3,43,960	360	56,170	98,50,817	4,04,013	0 7 11	0 4 5	One-24th
Chanda	95,28,877	7,73,451	2,39,840	5,44,950	1,28,040	1,12,15,158	2,50,072	0 5 9	0 1 1	One-45th
Wardha	71,16,167	13,88,052	27,560	33,36,315	80,670	1,19,48,764	5,12,345	0 9 1	0 7 6	One-23rd
Balaghat	62,64,432	2,21,193	94,520	—	19,950	66,00,095	1,59,217	0 5 5	0 3 5	One-42nd
Upper Godavari	2,86,300	15,417	240	9,525	2,520	3,14,002	19,968	0 13 8	0 5 7	One-16th
Jubbulpore	1,39,60,407	8,22,258	82,280	3,38,475	51,860	1,52,55,280	5,79,226	0 8 11	0 6 8	One-27th
Saugor	1,08,98,940	5,78,385	1,62,080	4,25,760	87,190	1,21,52,355	4,39,187	0 8 11	0 5 0	One-28th
Damoh	53,75,132	3,51,456	35,080	1,91,820	50,840	60,04,328	2,66,324	0 9 9	0 5 4	One-22nd
Seoni	87,00,782	6,22,899	42,320	1,40,040	36,550	95,42,591	1,49,403	0 3 9	0 2 7	One-64th
Mandla	58,77,147	1,85,550	25,200	9,855	31,470	61,29,222	93,567	0 3 7	0 3 11	One-65th
Chhindwara	71,99,105	5,97,987	3,81,720	6,13,920	27,500	88,20,232	2,19,565	0 6 0	0 3 3	One-40th
Hoshangabad	1,01,94,820	5,99,409	4,15,000	3,54,585	4,09,020	1,19,72,825	4,28,115	0 7 5	0 6 0	One-25th
Narsinghpur	80,29,972	79,992	95,360	8,23,890	45,280	90,74,494	4,21,810	0 10 11	0 8 10	One-21st
Betul	78,93,757	5,31,423	3,43,080	33,135	80,130	88,81,525	1,96,015	0 4 6	0 2 4	One-45th
Nimar	39,17,626	2,90,979	11,560	5,74,080	48,600	48,42,845	1,78,847	0 3 7	0 1 9	One-50th
Raipur	2,78,94,378	16,67,458	13,22,360	12,38,205	5,34,680	3,26,57,081	5,45,209	0 1 4	0 1 0	One-100th
Sambalpur	1,08,25,560	9,59,994	1,95,000	7,47,405	1,15,190	1,28,43,149	1,16,834	0 3 4	0 1 10	One-43rd
Bilaspur	1,02,47,658	6,08,900	4,20,800	8,47,500	—	1,21,19,858	2,64,664	0 3 4	0 1 10	One-43rd
Total	17,39,02,877	1,24,54,303	43,04,200	1,20,36,555	20,25,040	20,47,22,975	60,74,694	0 7 2	0 3 4	One-37th

I offer the following observations:—

The assessments were made between 1863 and 1869, except for Sambalpur, for which a ten years' summary settlement has recently been concluded. At the time of the assessments, owing to the increased cotton cultivation due to the American war, to the opening up of the country by roads, the progress of railway works, large exports of grain to Berar and Bombay, also to Malwa and Hindustan in times of local scarcity and other extraneous causes, prices of agricultural produce ruled high, and were not expected to continue. As a matter of fact, from 1870 to 1876 they generally fell. Now, again, owing to the vast exports of wheat and oil-seeds to Europe, and to the drain caused by famine in Madras, Bombay, and the Nizam's dominions, they are exceptionally high. The produce out-turn shown in statement (A.) for the time of the settlement is calculated for a good year, but on the present acreage. I have kept the same out-turn figures for the gross produce of the present day, but have in the second statement (B.) valued this at the present market rates. But it is obvious that with the recent increase of cultivation we now have a considerably increased gross produce over that which was obtained at the time of settlement; consequently, the proportion of land revenue at the time of settlement to the value of the gross produce

was heavier than that shown in statement (A.). Of course it is highly improbable that our present prices will be maintained; but on the other hand, our aggregate increase of production, coupled with the substitution of more valuable for inferior crops, will render the proportion of land revenue to the value of gross produce shown in my second statement, a fair index of our present condition as regards the incidence of the land revenue demand, and not very greatly in excess of what we may expect in the immediate future.

It was the especial work of the Settlement Officers to accurately adjust the revenue demand according to the capabilities of the different classes of land, and it is neither desired nor desirable to alter their excellent work in any way, even were it possible to do so.

The work of assessment was carried out from 1863 to 1869; in Sambalpur in 1876 and 1877.

There has been no practical difficulty in realizing the land revenue as now assessed. In a very few individual villages of Damoh, Murwara, and Bhandara, slight over assessments have been long ago corrected. There is now no difficulty whatever.

The dates at which the instalments of revenue are payable, and their relation to the ordinary period of harvest or of realization of rents, are as follows:—

	Harvests.		Payment of rents.		Payment of kists.	
	Kharif.	Rabi.	Kharif.	Rabi.	Kharif.	Rabi.
Nagpur	December, middle of.	April, middle of.	December, end of.	April, end of.	15th Jan.	15th May.
Wardha	Do.	Do.	Do.	Do.	Do.	Do.
Chanda, with Upper Godavari Sub-division	Do.	Do.	Do.	Do.	Do.	Do.
Bhandara	November	Do.	Do.	Do.	Do.	Do.
Balaghat, plains of	Do.	Do.	Do.	Do.	Do.	Do.
„ Uplands	December	Do.	January	May, early part	1st Feb.	1st June.
Seoni	Jan., early	April and early in May.	January, latter part.	May	Do.	Do.
Mandla	Do.	Do.	Do.	Do.	Do.	Do.
Jubbulpore	Do.	Do.	Do.	Do.	Do.	Do.
Damoh	Do.	Do.	Do.	Do.	Do.	Do.
Saugor	Do.	Do.	Do.	Do.	Do.	Do.
Narsinghpur	Do.	Do.	Do.	Do.	Do.	Do.
Hoshangabad	Do.	Do.	Do.	Do.	Do.	Do.
Betul	Dec. and Jan.	Do.	Do.	Do.	Do.	Do.
Chhindwara	December, middle of.	March and April.	December (end of).	March, end of.	15th Jan.	15th April.
Nimar	Do.	Do.	Do.	Do.	Do.	Do.
Raipur	November	Do.	Do.	Do.	Do.	Do.
Bilaspur	Do.	Do.	Do.	Do.	Do.	Do.
Sambalpur	Do.	Do.	Do.	Do.	Do.	Do.

The Government demand is paid for each village in exact proportion to its kharif or to its rabi cultivation, and rents are collected exactly on the same basis. No interest is charged.

BERAR.

BERAR.

Mr. Dunlop.

With respect to the proportion borne by the land revenue to the value of the gross produce the information is limited, and not very reliable, owing to the difficulty of ascertaining the actual value of produce per acre. Major Szczepanski estimates that the land revenue in the Wun district bears a proportion of about $\frac{1}{8}$ to the value of the gross produce.

Mr. Beynon, in his Settlement Report on the Chandur taluka (Amraoti district) in 1873, made the following estimate:—

“According to the present market prices the average rate of 13 annas 10 pies is equivalent to a grain rent per acre of 55½ lbs. of jowari, and 3lbs. of cleaned cotton. Taking the average yield per acre of these staples to be 400 seers of jowari and 45 lbs. of

cleaned cotton, the average Government demand for the entire taluka under the proposed rates represents about $\frac{1}{4}$ and $\frac{1}{3}$ of the gross produce respectively. This is irrespective of the straw and cotton seed, both valuable commodities; so there can be no doubt, notwithstanding the large increase in revenue, that the average pressure of the proposed settlement will be very light.”

The revenue is payable in two instalments, the first of which is due on the 15th January, and the second on the 15th March.

The kharif crops are reaped in December, and the spring crops in February, and the above dates are quite convenient for the agriculturists, many of whom voluntarily pay their whole assessment in January.

CHAP. I. QN. 13.

BERAR.

Mr. Jones.

Owing to its small size, its compact area, and its general homogeneity of soil, population, and productions, Berar affords peculiar advantages for the prosecution of some of the inquiries which the Commission propose to themselves to make. I will give an instance. We have in Berar an almost perfect measure of the pressure of our land revenue assessment. Attempts have often been made to arrive at such a measure in other provinces; but I have never seen any which I could regard with even a moderate amount of confidence. In Berar we produce an article, cotton, which supplies such a measure, because—

- (a) it is produced on a sufficiently large scale:
 (b) it is all (except what is retained for home consumption, a quantity which, if not accurately ascertained, is certainly comparatively insignificant) exported by railway; and every pound exported is therefore known:
 (c) our imports are extremely small and are known:
 (d) the price of cotton is known:
 (e) the area under cotton is known.

The following extract from the Cotton Report, submitted with my letter No. 3,549 of 23rd August 1878, will show what the result of applying this measure is. It expresses our land revenue in terms of cotton acreage:—

"The figures showing the value of the crop, which may be implicitly relied on, afford an incontestable proof of the immense importance of the cotton crop to the cultivator. Roughly speaking, less than one-fourth of the cotton crop suffices to pay for the whole land revenue of Berar.

	Quantity.	Value.
1877-78.	Cwt.	Rs.
Exported - - - - -	1,199,170	2,65,81,602*
Retained for local consumption - - - - -	97,523	21,61,760*
		2,87,43,362"

* Calculated at 3 annas and 2 pies per pound.

In making the above extract, my object has not been to show what the pressure of our land revenue is,—to do that accurately an average of several years would have to be taken,—but to point out that we have a measure of its pressure, should the Commission desire to base any inquiry upon it. The field of investigation which such a measure throws open to us seems to me to be capable of being made a very fruitful one. A mere glance at the figures presented above may serve to demonstrate the untrustworthiness of the figures with which Mr. Hyndman startled his readers the other day. And if we might argue that all crops tend to the same money value, and that therefore the value of the crop of the whole cultivated area may be roughly deduced from that of cotton, we should open a wide field of statistical inquiry. I am, of course, aware that such an inquiry would be hazardous, because much of what is produced does not come to market; but in any case there seems to be room for valuable speculation. And I am inclined to think that, owing to the indebtedness of the cultivating classes, the proportion of the total produce of the country that is in fact, though not in appearance, brought into market, and therefore influences market values, is very large indeed. My meaning is, that although much of the produce of the country remains in the cultivator's hands, yet that it remains there after having passed through his banker's books in one shape or another. That, in fact, the bankers get the crops, and re-sell; and that this process has very much the same effect as an actual bringing to market.

The revenue kists cannot be said to bear any fair proportion to the value of the several harvests; for the two kists are equal, whereas the kharif harvest is immeasurably the more important.

The kists are payable as follows: The first on 31st January; the second on the 15th March.

The result is, that the whole demand being in the majority of villages paid from the kharif crop, the cultivator pays half his revenue at a very suitable time, and the other half rather late. Even in villages with a large rabi cultivation the dates are probably sufficiently favourable to the cultivator.

BOMBAY.

The incidence of the land revenue on the cultivated area is given in a table below. The proportion which the assessment bears to the gross produce has been ascertained by a series of careful experiments continued for several years. The printed reports and comments on these experiments are provided for reference. The general result is that the assessment does not amount to one-sixth of the gross produce, and is often no more than one-thirtieth or one-fortieth. Of course it varies much with the season. The universal opinion of the collectors is that the incidence is fair, the rates having been very carefully fixed by the revenue survey as a rent-charge varying with the productive quality of the land. There is no practical difficulty in realizing the land revenue as now assessed, except in years of scarcity. The instalments have been carefully fixed by the Survey Rules (see Nairne's Handbook, p. 121), so that the ryot is called upon to pay immediately after he has harvested and sold his crops. They can be readjusted on the report of the collector, but the unanimous opinion is that they are now judiciously fixed. If an instalment* is not paid within 10 days, a notice is issued for which the defaulter has to pay 4 annas if the amount due does not exceed 5 rupees, and 8 annas if it does.† If payment has to be enforced by law, a fine not exceeding one-fourth of the sum due is leviable, but is generally remitted in years of

scarcity. No interest is now charged on instalments overdue.

The following statement shows the incidence of the Government revenue per acre in all districts:—

Collectorate.	Dry Crop.	Garden.	Rice.
NORTHERN DIVISION.	Rs. a. p.	Rs. a. p.	Rs. a. p.
Ahmedabad - - -	1 4 9	5 8 3	4 7 7
Kaira - - - - -	2 9 1	5 1 2	4 6 11
Panch Mahals - -	1 3 5	2 1 11	2 5 11
Broach - - - - -	4 3 11	6 15 7	5 10 6
Surat - - - - -	2 10 7	9 8 10	7 13 7
Thana - - - - -	0 3 3	5 6 0	3 3 2
Kolaba - - - - -	0 3 2	5 8 10	4 6 7
Nasik - - - - -	0 9 2	1 11 4	2 9 4
Khandesh - - - -	1 1 10	3 13 3	—
SOUTHERN DIVISION.			
Poona - - - - -	0 7 11	1 5 9	2 3 5
Ahmednagar - - -	0 7 5	2 5 2	1 8 1
Sholapur - - - -	0 6 8	1 1 6	1 7 4
Satara - - - - -	0 11 5	3 14 5	3 12 0
Ratnagiri - - - -	0 6 5	9 12 6	4 3 5
Belgaum - - - - -	0 10 3	3 0 3	2 14 6
Kaladgi - - - - -	0 7 6	1 6 5	1 9 11
Dharwar - - - - -	0 14 3	5 7 0	2 2 5
Kanara - - - - -	0 7 6	8 9 0	2 8 6

Most carefully conducted experiments on crop to ascertain the proportion of assessment to gross produce have been carried on under the orders of Government by the collectors principally during the

* Nairne's Handbook, p. 122.

† For limitation of increase on revision, Nairne's Handbook, p. 107.

last few years. These experiments have been too few in number, and spread over too short a space of time, to justify any decided general conclusions being arrived at. Besides, the enormous fluctuations in prices of the past four years would upset the conclusions based on the results of any one year. My impression is that we are safe in saying that in fair land in the general run of seasons with ordinary cultivations and average prices, the assessment absorbs less than one-eighth of the gross produce, and in poor land under the same conditions a very much smaller proportion. In many experiments on poor soil the result has shown the assessment to be under 5 per cent. of the gross produce.

SINDH.

The general incidence of land revenue on the cultivated area is about Re. 1-14 per acre.

	Rs.	A.
On rice land - - -	2	12
On wheat land - - -	2	6
On joari and bajri land - - -	1	12

The revenue collected may be equivalent to a tenth of the gross produce. The incidence on the various classes of land is fairly distributed. The settlements are all for periods of 10 years only, and they have been introduced at various periods since 1862-63. There has been no practical difficulty in realizing the revenue as now assessed: Instalments of revenue are payable—

For kharif crops.
 1st January.
 15th February.
 1st April.
 For rabi crops.
 15th May.
 15th June.
 15th July.

The kharif harvest is well gathered in before any demand is made on account of Government revenue. In the case of the rabi, the necessity of collecting everything within the revenue year unduly hastens instalments which, to bear easily on the people should begin about 1st June and end 1st September. Interest on land revenue in arrears is not now charged.

MADRAS.

Incidence of Land Revenue.—A statement is given in the Appendix showing with regard to ryotwari lands—

- (1) the area and assessment of cultivable land, including waste;
- (2) the area and assessment of land under occupation; and
- (3) the area and assessment of land ordinarily cultivated, and the rates of assessment per acre of dry and wet land under each of the above heads.

The subjoined statement shows the rate of assess-

ment per acre of holding, the proportion of wet and dry to total area of holdings, the proportion of waste to culturable area, and the average size of a holding for each district, except Malabar and Canara which have never been surveyed.

N.B.—Second crop charge and water tax have not been taken into account in the "wet" rates shown in column 6. In the Kistna and Godavari Deltas wet land is assessed as if it were dry, and water is charged for at the rate of four rupees an acre.—

Districts.	Population per Square Mile.	Average Size of a Holding.	Average Assessment of a Holding.	Proportion of Dry and Wet Cultivation to Total Cultivation.		Rate of Assessment per Acre of Holding.			Percentage of Waste.
				Dry.	Wet.	Dry.	Wet.	Total.	
1	2	3	4	5		6			7
		Acre.	Rs. a. p.			Rs. a. p.	Rs. a. p.	Rs. a. p.	
Ganjam - - - - -	182.9	7.7	16 14 11	38	62	1 3 6	2 12 11	2 3 3	13
Vizagapatam - - -	117.7	15.8	38 6 8	68	32	1 1 11	5 2 9	2 6 10	13
Godavari - - - - -	255.9	10.9	22 10 9	47	53	1 11 3	2 9 1	2 1 0	34
Kistna - - - - -	180.7	12.2	19 4 1	89	11	1 8 0	2 4 1	1 9 4	19
Nellore - - - - -	162.7	10.8	21 7 11	78	22	1 2 7	5 4 10	1 15 11	34
Cuddapah - - - - -	161.5	8.5	10 14 6	92	8	0 12 0	6 11 10	1 4 5	53
Bellary - - - - -	151.5	16.4	13 8 2	95	5	0 10 0	4 13 9	0 13 2	49
Kurnool - - - - -	130.4	13.3	14 0 6	98	2	0 14 11	6 3 7	1 0 10	35
Madras - - - - -	14,724.1	—	—	—	—	—	—	—	—
Chingleput - - - -	340.7	8.4	21 14 1	41	59	1 6 1	3 9 7	2 9 7	38
North Arcot - - - -	282.3	3.3	9 1 9	67	33	1 6 2	5 11 1	2 12 1	39
South Arcot - - - -	360.3	4.1	10 6 3	75	25	1 10 11	5 6 1	2 8 3	40
Tanjore - - - - -	540.1	7.3	28 4 2	25	75	1 3 10	4 13 9	3 13 2	9
Trichinopoly - - - -	341.5	6.8	9 7 4	84	16	0 14 10	4 2 9	1 12 6	25
Madura - - - - -	238.5	6.2	11 1 2	83	17	1 4 7	4 2 3	1 12 6	31
Tiruvellur - - - - -	327.3	8.4	15 11 0	84	16	0 12 5	8 9 8	1 14 1	8
Coimbatore - - - - -	237.3	10.7	12 3 2	96	4	0 14 2	7 5 4	1 2 3	25
Nilgiris - - - - -	66.0	16.5	11 14 4	100	—	0 11 1	2 10 5	0 11 6	13
Salem - - - - -	262.9	6.5	9 9 6	92	8	1 2 1	5 8 6	1 7 7	26
Total - - - - -	226.2	7.8	14 1 0	82	18	1 0 9	4 10 10	1 11 0	33

Q 3387.

CHAP. I. QN. 13.

BOMBAY.

Colonel Anderson.

SINDH.

Colonel Haig.

MADRAS.

Board of Revenue.

CHAP. I. QN. 13.

MADRAS.

Board of
Revenue.

Proportion to value of gross produce.—For the portions of the presidency settled by the Settlement Department a statement showing the proportions of the gross and nett produce of lands taken to represent the Government revenue has been furnished by the Director of Revenue Settlement, and is given in the appendix. The principle adopted in the settlement is that the value of the nett produce, after making deductions on account of the vicissitudes of season and the expenses of cultivation, should be equally divided between the ryot and Government. In the earlier settlements, however, viz., those of the Che-

lambaram Taluq of South Arcot, the Western Delta of Godavari, and the Masulipatam portion of Kistna, the assessment was fixed as nearly as possible at the mean of 30 per cent. of the gross, and two-thirds of the nett value of the produce. Prices having advanced since some of these settlements were completed, the proportions borne by the assessment to the gross produce have diminished. The following statement shows the proportions of assessment to value of gross produce at the commutation rates adopted for the settlement, and at the prices ruling during the last three years preceding the famine:—

Districts or Portions of the District settled.			Per-centage of Assessments to Value of the Gross Produce at Comutation Rates.	Per-centage of Assessment to Value of the Gross Produce at Ordinary Prices of recent Years.		
Cuddapah	{	Delta	{ Eastern and Central	- - - - - { Dry.	20	12
			Western	- - - - - { Dry.	13	8
	{	Upland	- - - - -	{ Dry.	12	7
				{ Wet.	22	14
Kistna	{	Guntoor Portion	- - - - -	{ Dry.	15	8
				{ Wet.	21	13
	{	Masulipatam Portion	- - - - -	{ Dry.	18	7
				{ Wet.	21	12
Nellore	{	Principal Division	- - - - -	{ Dry.	18	13
				{ Wet.	23	17
	{	Sub-Division	- - - - -	{ Dry.	18	11
				{ Wet.	23	17
Cuddapah	{	Three Taluks, Jammalamadugu	- - - - -	{ Dry.	15	9
				{ Wet.	16	11
	{	Three taluqs, Badvil, &c.	- - - - -	{ Dry.	14	8
				{ Wet.	17	11
Kurnool	{	Proper	- - - - -	{ Dry.	16	9
				{ Wet.	16	10
	{	Pattikonda	- - - - -	{ Dry.	13	8
				{ Wet.	17	12
	{	Cumbum and Markapur	- - - - -	{ Dry.	13	8
				{ Wet.	19	13
{	Koilkuntla	- - - - -	{ Dry.	17	12	
			{ Wet.	18	13	
Chingleput	{		- - - - -	{ Dry.	15	10
				{ Wet.	20	13
South Arcot, Chelambaram	{		- - - - -	{ Dry.	15	8
				{ Wet.	31	16
Trichinopoly	{		- - - - -	{ Dry.	13	6
				{ Wet.	28	11
Tinnevelly	{		- - - - -	{ Dry.	—	—
				{ Wet.	25	14
Salem	{	South	- - - - -	{ Dry.	13	7
				{ Wet.	21	13
	{	North	- - - - -	{ Dry.	12	6
				{ Wet.	17	10

It must, however, be remembered that the commutation rates represent the price at which the ryots then disposed of, of their grain in their village, and this was often arrived at by deducting as much as 30 per cent. from the wholesale prices charged by merchants, to allow of a margin for the cost of carriage of grain and the wholesale dealers' profits.

The new settlement rates have been introduced in the districts of Godavari, Kistna, Nellore, Kurnool, Chingleput, Salem, Tinnevelly, and in parts of Cuddapah and South Arcot. They have been sanctioned for Ganjam and Coimbatore, but have not yet been introduced. A succinct account of the principles of the settlement will be found at pages 160-3 of Mr. Maclean's standing information regarding the official administration of the Madras Presidency.

No experiments have been made since the settlements to show the proportions of assessment to produce, with reference to the present outturn, but most of the settlements have been concluded very recently.

Although the proportions shown in the tables above given are only for the average rates of assessment for the whole district, there is no reason to fear that there are many inequalities in individual cases, as one

of the special aims of the recent settlements has been the equalization of rates and the removal of anomalies which existed largely under the old settlements.

It is nearly impossible to say what proportion of the value of gross produce represents the Government assessment in most of the districts not yet dealt with by the Settlement Department, numerous changes having, from time to time, been made since the assessment was fixed, and no uniform principle having been adopted at the time of the original settlement. In districts in which there was a rough survey, a fixed share of the gross produce, often exceeding 50 per cent., was taken to represent the Government assessment and commuted into money at rates representing the average selling prices at the time; but the assessments thus fixed having been found to be more heavy than the lards could bear, extensive reductions had to be made, and this was effected not on a fresh calculation of produce and prices, but by a general per-centage of reduction. Detailed information regarding the manner in which the old assessments were fixed in each district will be found in the collectors' replies, but they do not admit of being tabulated here.

Assuming that the rates of produce reported by collectors, with reference to Question 3, represent the

average production of the land in each district, the proportion of the average rate of assessment to the value of gross produce may be estimated as follows:—

Districts.		Per-centage of assessment to value of gross produce.	
		Dry.	Wet.
Ganjam		8	14
Vizagapatam		10	18
Bellary		9	15
North Arcot		11	11
Tanjore		8	13
Madura		9	9
Coimbatore		8	16
Malabar		12	

The Board do not attach much value to the above estimate as everything depends upon how far the collector's estimate of outturn can be relied on as representing the *average* of the district, but it is given for what it is worth.

Realization of Revenue.—No difficulty has been experienced in the realization of the revenue under the new settlements, nor even under the old ones, since reductions were granted, especially between 1854 and 1858, wherever it was found that the assessments were higher than the land could fairly bear. The high prices which have ruled of late years have enabled the ryots to pay up their dues with ease. The increase in the number of co-ecive processes in the realization of the Government demand is not due to the pressure of the assessment. The subject will be alluded to in reply to Question 14.

The ryotwar revenue and the Inam quit-rents are paid according to instalments fixed by the Board of Revenue, and shown below:—

STATEMENT showing the RYOTWARI CULTURABLE AREA and the INCIDENCE of ASSESSMENT per ACRE of LAND.

Districts.	LAND IN OCCUPATION.								
	Dry.			Wet.			Total.		
	Extent.	Assessment.	Rate per Acre of Land.	Extent.	Assessment.	Rate per Acre of Land.	Extent.	Assessment.	Rate per Acre of Land.
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
Ganjam	Acs.	Rs.	Rs. a. p.	Acs.	Rs.	Rs. a. p.	Acs.	Rs.	Rs. a. p.
Vizagapatam	1,16,092	1,41,721	1 3 6	187,771	5,27,818	2 12 11	303,863	6,69,539	2 3 3
Godavari	53,399	59,786	1 1 11	25,310	1,31,226	5 2 9	78,709	1,91,012	2 6 10
Kistna	419,994	7,15,592	1 11 3	297,238	7,64,570	2 9 1	717,232	14,80,162	2 1 0
Nellore	1,611,715	24,16,871	1 8 0	194,216	4,38,407	2 4 1	1,805,931	28,55,278	1 9 3
Cuddapah	773,750	9,01,692	1 2 7	193,040	10,24,733	5 4 10	966,790	19,26,425	1 15 11
Bellary	1,187,909	8,93,074	0 12 0	114,958	7,75,026	6 11 10	1,302,867	16,68,100	1 4 5
Kurnool	2,376,103	14,92,400	0 10 0	114,233	5,55,481	4 13 9	2,490,342	20,47,881	0 13 2
Chingleput	1,179,065	11,02,876	0 14 11	27,341	1,70,227	6 3 7	1,206,406	12,73,103	1 0 10
North Arcot	234,942	3,24,109	1 6 1	286,093	10,30,156	3 9 7	521,035	13,54,265	2 9 7
South Arcot	443,899	6,16,464	1 6 2	206,060	11,73,009	5 11 1	649,959	17,89,473	2 12 1
Tanjore	964,353	16,24,948	1 10 11	285,153	15,16,064	5 6 1	1,249,506	31,41,012	2 8 3
Trichinopoly	298,913	3,71,327	1 3 10	746,399	36,27,709	4 13 9	1,045,312	39,99,036	3 13 2
Madura	829,062	7,77,185	0 14 10	136,127	5,68,097	4 2 9	965,189	13,45,282	1 6 4
Tinnevelly	745,660	9,59,680	1 4 7	157,387	6,51,840	4 2 3	903,047	16,11,520	1 12 6
Coimbatore	1,177,015	9,19,147	0 12 5	191,892	16,51,973	8 9 8	1,368,907	25,71,120	1 14 1
Nilgiris	2,225,473	19,78,668	0 14 2	89,812	6,58,901	7 5 4	2,315,285	26,37,569	1 2 3
Salem	88,464	61,349	0 11 1	1,274	3,382	2 10 5	89,738	64,731	0 11 6
South Canara	1,133,873	12,80,608	1 2 1	95,988	5,30,961	5 8 6	1,229,861	18,11,589	1 7 7
Malabar	403,395	6,36,436	1 9 3	387,169	11,65,237	3 0 1	790,564	18,01,673	2 4 6
Total	16,263,082	1,72,73,933	1 1 0	3,737,461	1,69,64,837	4 8 8	20,000,543	3,42,38,770	1 11 4

CHAP. I. QN. 13.

MADRAS.

Board of
Revenue.

CHAP. I. QN. 13.

AVERAGE RYOTWARI CULTIVATION during the FOUR YEARS ending 1875-76, and INCIDENCE per ACRE of CULTIVATED LAND.

MADRAS.
Board of
Revenue.

	Dry.			Wet.			Total.		
	Extent.	Assessment.	Rate per Acre.	Extent.	Assessment.	Rate per Acre.	Extent.	Assessment.	Rate per Acre.
	Acre.	Rs.	Rs. a. p.	Acre.	Rs.	Rs. a. p.	Acre.	Rs.	Rs. a. p.
Ganjam - - -	103,800	1,34,941	1 4 9	171,766	5,01,555	2 14 8	275,566	6,36,496	2 4 11
Vizagapatam - -	50,211	54,004	1 1 2	23,460	1,23,808	5 4 5	73,671	1,77,812	2 6 7
Godavari - - -	250,332	5,11,540	2 0 8	277,143	7,29,692	2 10 1	527,475	12,41,232	2 5 8
Kistna - - -	1,433,311	21,45,838	1 8 0	174,109	4,63,301	2 10 7	1,607,420	26,13,139	1 10 0
Nellore - - -	590,431	7,30,986	1 3 9	165,891	8,58,658	5 2 10	756,322	15,89,644	2 1 7
Cuddapah - - -	1,114,487	8,71,197	0 12 6	99,574	6,76,787	6 12 9	1,214,061	15,47,984	1 4 5
Bellary - - -	2,293,323	14,54,036	0 10 1	101,526	5,03,729	4 15 4	2,394,849	19,57,765	0 13 1
Kurnool - - -	1,172,146	10,96,955	0 14 11	25,699	1,63,261	6 5 7	1,197,845	12,60,216	1 0 9
Madras - - -	-	-	-	-	-	-	-	-	-
Chingleput - - -	168,387	2,44,230	1 7 2	243,883	9,04,817	3 11 4	412,270	11,49,047	2 12 7
North Arcot - -	378,148	5,32,159	1 6 6	184,812	10,68,011	5 12 5	562,960	16,00,170	2 13 5
South Arcot - -	794,611	13,64,129	1 11 5	267,397	14,36,849	5 5 11	1,062,008	28,00,978	2 10 2
Tanjore - - -	233,511	2,92,165	1 4 0	711,434	35,00,604	4 14 8	944,945	37,92,769	4 0 2
Trichinopoly - -	674,859	6,60,915	0 15 8	129,191	5,45,523	4 3 6	804,050	12,06,438	1 8 0
Madura - - -	650,237	8,55,774	1 5 1	138,543	5,86,537	4 3 9	788,780	14,42,311	1 13 3
Tinnevely - - -	811,930	7,31,538	0 14 5	158,451	15,06,637	9 8 1	970,381	22,38,175	2 4 10
Coimbatore - - -	1,958,428	17,74,663	0 14 5	82,863	6,14,488	7 6 8	2,041,291	23,89,151	1 2 8
Nilgiris - - -	48,562	30,393	0 10 0	30	67	2 3 9	48,592	30,460	0 10 0
Salem - - -	1,070,924	12,27,672	1 2 4	86,267	4,86,529	5 10 3	1,157,191	17,14,201	1 7 8
South Canara - -	-	-	-	-	-	-	-	-	-
Malabar - - -	393,936	6,21,800	1 9 3	386,366	11,64,143	3 0 2	780,302	17,85,943	2 4 7
Total - - -	14,191,574	1,53,38,935	1 1 3	3,428,405	1,58,34,996	4 9 10	17,619,979	3,11,73,931	1 12 3

RAJPUTANA.

Captain Law.
Major Powlett.
Mr. Spencer.

RAJPUTANA.

Captain Law, Alwar.—The rent-rates on which the assessment was based will be found at page 187 of the *Alwar Gazetteer*. Calculating from these, which will give an approximate, though not a correct, average, it would appear that the mean rate is about Rs. 2-12-9. The rates for irrigated land vary a great deal, but give an average of Rs. 4-0-6; those of unirrigated land one of about Rs. 1-9-7. The land revenue usually equals two-thirds of these rates. Major Powlett says (page 184): "The portion of the net assets fixed as 'the State's share was generally two-thirds. But 'where three-fourths or more had been paid without 'apparent difficulty, three-fourths were determined.' The sum paid to the State by the landholder would be two-ninths of the gross produce.

The incidence on the various classes of land is fairly distributed. The assessment was fixed in 1876; but it was collected in some instances at the new rates before this date.

There has been no practical difficulty in realizing the land revenue as now assessed till after the failure of the rains in 1877.

The revenue is paid in two instalments in each season. The dates they become due are—in the autumn, "Mangsir badi ekum," say about the middle of November and a month later; and in the spring, "Baisakh badi ekum," say about the end of April or beginning of May and a month later. They are so arranged as to admit, as far as possible, of the zamindar selling his crops or collecting his rents from his cultivators before his first instalment becomes due. And the several instalments bear a fair proportion to the value of the several harvests from which the revenue or rent has to be made good.

A rate of interest at Rs. 3-2 per cent. is charged on land revenue in arrears.

Major Powlett, Kotah.—Paragraph 13.—I cannot yet give the general incidence of rent on land for the whole Kotah State; but for two parganas which have been surveyed and assessed recently the unirrigated is approximately Rs. 2-10 per acre. The irrigated may be set down as approximately Rs. 10.

The price cultivators get for their crops is so much below the town market rates, that I believe the above to represent about one-third of the grass-produce on

both irrigated and unirrigated; but at present I feel little trust in the estimate of the land's productive power. Rent-rates in Kotah are very numerous. Since however they have prevailed for 100 years, it was thought inexpedient to alter them much at the Ryotwari settlement now being made, but only to readjust them. It was found in most villages that some persons did not pay nearly the full rates properly due on their lands, while the most helpless paid more than the full rates. By applying the prevailing rates, about which there could be no doubt, as every cultivator's account is with the State, not with a landlord, reduction was given in nearly a third of the holdings; although the total revenue demand was raised 7 per cent.

There are three revenue instalments in Kotah. The first, of 25 per cent., is due at the beginning of November, a month before the kharif grain can be sold; the second, of 45 per cent., at the beginning of February; and the balance in May. In Boondie, where after each harvest the cultivated land is roughly measured before the demand is made, the rents are taken in a lump sum after the crops are gathered; and there, I am told, arrears are small, while in Kotah they are considerable. Interest is charged on arrears at 12 per cent. per annum; but it is remitted in many cases when the chance of getting it is remote; and it never is allowed to exceed the principal.

Mr. Spencer, Bhartpur.—The average land revenue collected from the cultivated area, which is estimated at bigahs 1,692,892, is Rs. 1-3-9 per bigah, and for the different classes of land it is as follows: For well land Rs. 3 and Rs. 4, irrigated land Rs. 2 and Rs. 2-8, rain land Rs. 1, Rs. 0-14, Rs. 0-12, and Rs. 0-8 per bigah. The total land revenue, which amounts to Rs. 20,16,584-3-0, represents the one-sixth portion of the whole produce of the State. This rental was fixed after much reflection from data prepared during the minority, and can be collected with ease; the inhabitants of a few of the villages who complained that the assessment was a heavy one have been placed under the *khdm* system. The whole of the revenue is paid in four instalments, thus—kharif, two instalments, October and November; and rabi, two instalments, April and May.

CHAP. I. QN. 1
CENTRAL
INDIA.Col. Osborne
Lieut.-Col.
Bannerman.
Mir Shahama
Ali.
Pundit Suroop
Narain.

CENTRAL INDIA.

Colonel W. Osborne, Bhopal.—"The revenue of the following classes of land is:—

1. Kalmat or wheat land,	2½	Rs. per acre.	} Dependent on rainfall.
2. Bhamar, jowar bajra land	1½	"	
3. Siar or kodu, tilli land,	1	"	
1st class Chahi, rice, sugar-cane, and opium land	20	"	watered by tanks.
2nd class do.	10	"	watered by wells.
3rd class do.	6	"	watered by rivers.

On opium land the cultivators' profits are two-thirds on other lands half. There is no difficulty in collecting the revenue. It is realized in four equal instalments, viz., in October, after cutting makka and rice crops; in December, after reaping jowar crops; in February, after opium and sugar-cane crops; and in April, after wheat and gram crops have been harvested. No interest is charged by the State on land revenue due; the cultivators, when necessary, borrow from bankers, so that there are hardly any arrears."

Lieutenant-Colonel Bannerman, Baghelkhand.—"The land revenue is very little in excess of the gross rental; if the latter is greater than the former, it is from 7 to 15 per cent., the average being say 10 per cent. The average proportion of revenue to the value of the gross produce, inclusive of cultivators' charges, may be estimated roughly at one-fifth.

The assessment was fixed in 1875 and is still in force; there has been no difficulty in realizing it in ordinary years.

The instalments of revenue are payable four times during the year:—

- 1st.—15th Aghani Soodi—December.
 - 2nd.—15th Magh Soodi—February.
 - 3rd.—15th Chait Soodi—April.
 - 4th.—15th Baisakh Soodi—May,
- corresponding to a great extent with the periods of harvest. Each instalment is 4 annas, or one-fourth of the revenue for the year, and on the whole they bear a fair proportion to the value of produce.

In former days from 12 up to 25 per cent. was charged on arrears, at present no such charge is made."

Mir Shahamat Ali, Rutlam.—"The rate of revenue on cultivated land on the average is Rs. 1-12-0, and on cultivated and culturable 14 annas per beegah (2 beegahs=1 acre). The proportion of revenue to the value of gross produce at the prevailing market rates is nearly one-fifth, both of dry and irrigated land.

This is a fair adjustment of revenue, considering the proceeds of the cultivators' land. The assessment was re-fixed in 1877-78. No difficulty is apprehended in realizing the revenue as assessed. The revenue is payable by four instalments, on dates noted below.* The first instalment is suited to the proceeds of mukka, the second of jowari, the third of opium, and the fourth of wheat. A period of 15 days is allowed within which each instalment should be fully paid. Beyond it, it is as a rule chargeable with Rs. 2 interest. They bear a fair relation to the ordinary periods of harvests, as well as to their values. The last instalment is made higher to enable an easy recovery of arrears, if due, for the preceding instalments, as well as that instalment itself."

Pundit Suroop Narain, Manpur.—"The Government rates on cultivated land in Manpur are: for dry land per beegah Rs. 1-2-0, for wet land per beegah Rs. 6-10-0. Some of the Malgoozars in settled villages sublet their holdings on increased rates ranging in the case of dry land to Rs. 2-4-0, and in that of wet land to Rs. 7 or 8. This increase of rates is a mere private arrangement and not recognized by Government, and can last only at the will of the parties. The Bheels pay at the rate of Rs. 3 per plough on dry, and Rs. 4 per beegah on wet land. The rates in Manpur are much lighter than those prevailing within bordering native territory, where the rate on dry land goes up as high as Rs. 3 per beegah, and from Rs. 8 to 20 on wet land. The assessment of the seven settled villages was fixed, as already stated, for 20 years in 1867. The rates being so easy, no difficulty is felt in realizing the revenue, which is paid promptly by the people in ordinary years. Three-fourths of the Government demand is realized in May after the wet crops (including the opium) are harvested, and one-fourth in December after the harvesting of jowari, the chief item of the dry crops; no better arrangement of instalments could be made. Revenue seldom falls in arrears, and whenever it does, in case of poorer Bheels, no interest is charged. Compared to rates in bordering native territory, those in Manpur can admit of increase; but the convenience enjoyed by cultivators in native territory, in the shape of getting suspensions and remissions of revenue and advances for seed and cattle, being wanting here, it would not be advisable for the present to make any change in existing revenue rates in Manpur."

* 11th September, 4 annas; 9th December, 4 annas; 8th March, 6 annas; 10th May, 2 annas.

CHAP. I. QN. 18.

HYDERABAD.

Moulvie
Mahdi Ali.

HYDERABAD.

INCIDENCE OF LAND REVENUE ON THE CULTIVATED AREA.

The following Tabular Statement is prepared from the Administration Report for 1284 Fasli.

Number.		District.	Cultivated Area in 1284 Fasli.								
			Wet.			Dry.			Total..		
			Acres.	Assessment in British Rupees.	Rate per Acre.	Acres.	Assessment in British Rupees.	Rate per Acre.	Acres.	Assessment in British Rupees.	Rate per Acre.
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
1	Telingana.	Maydak -	48,212	Rs. 5,27,187	Rs. A. P. 10 13 6	89,304	Rs. 3,35,971	Rs. A. P. 3 12 3	137,516	Rs. 8,63,158	Rs. A. P. 6 4 5
2		Indur -	36,383	8,22,100	22 9 7	164,081	4,19,163	2 8 10	200,464	12,41,263	6 3 0
3		Yalgundal -	111,041	10,49,297	9 7 2	322,415	5,06,764	1 9 1	433,456	15,56,061	3 9 5
4		Sirpur Tandur -	2,406	14,129	5 14 0	179,594	1,23,637	0 11 0	182,000	1,37,766	0 12 1
5		Khammam -	70,197	9,54,547	13 9 7	360,621	4,98,323	1 6 1	430,818	1,45,287	3 5 11
6		Nalgunda -	41,546	4,03,670	9 11 5	432,792	4,94,016	1 2 3	474,338	8,97,686	1 14 4
7		Nagar-Karnul -	48,310	7,97,931	16 8 3	275,969	2,43,513	0 14 1	324,279	10,41,444	3 3 4
		Total Telingana	358,095	45,68,861	12 12 2	1,824,776	26,21,387	1 6 11	2,182,871	71,90,248	3 4 7
8	Maratwadi.	Aurangabad -	43,384	1,98,482	4 9 2	1,378,703	12,65,733	0 14 9	1,422,087	14,64,215	1 0 5
9		Beed -	21,670	70,704	3 4 2	1,475,822	9,70,647	0 10 6	1,497,492	10,41,351	0 11 1
10		Parbhani -	41,605	1,04,514	2 8 2	964,978	9,04,446	0 14 11	1,006,583	10,08,960	1 0 0
11		Bidar -	6,893	69,811	10 2 0	376,016	6,74,048	1 12 8	382,909	7,43,859	1 15 0
12		Nander -	10,019	24,858	2 7 8	834,153	11,27,119	1 5 7	844,172	11,51,977	1 5 10
13		Naldurg -	11,623	48,977	4 3 5	492,607	3,03,924	0 9 10	504,230	3,52,901	0 11 2
14		Gulbarga -	11,771	1,98,998	16 14 6	375,015	5,66,951	1 8 2	386,786	7,65,949	1 15 8
15	Maratwadi.	Shorapur -	6,307	65,797	10 6 10	557,185	6,25,493	1 1 11	563,492	6,91,290	1 3 7
16		Raichur -	14,667	75,259	5 2 1	782,003	7,16,942	0 14 8	796,669	7,92,201	0 15 10
17		Lingsugur -	8,322	55,012	6 9 9	868,562	7,02,382	0 12 11	876,884	7,57,394	0 13 10
		Total Maratwadi	176,260	9,12,412	5 2 10	8,105,044	78,57,685	0 15 6	8,281,304	87,70,097	1 0 11
		GRAND TOTAL	534,355	54,81,273	10 4 1	9,929,820	1,04,79,072	1 0 11	10,464,175	1,59,60,345	1 8 4

At first sight it appears from the foregoing statement that in the Telingana country the rates of assessment for both wet and dry lands are somewhat high. This, however, is not actually the case. The reason why these rates appear high may be explained by the fact that so recently as 12 years ago the *Batai* (payment-in-kind) system prevailed in the province of Telingana, and hence no efforts were made to get at the correct area of the cultivated lands of each village. So long as Government received a certain share of the produce of the cultivated lands, it did not much matter what the area of that land was. No such accurate survey seems to have been made in the Telingana country in times past as appears to have been made in the Maratha country. It is only since money payments were introduced in Telingana that anything like an attempt to ascertain the area of each field has been made. The result is that the areas thus obtained in a rough haphazard way are exceedingly inaccurate, and are not reliable. But as these areas have been recorded by the Patels and Patwadis of the villages, it naturally follows that the error is to the advantage of the ryots. This fact has been ascertained in two ways; *first*, by a rough survey executed through the agency of the Patels and Patwadis; and, *secondly*, by a systematic survey executed by trained officers. The result of the first survey showed an increase of about 50 per cent. over the previously recorded area of wet land, and about 75 per cent. over that of dry land. The results arrived at by the other survey are still more striking, being an increase of 393 per cent. in dry land, and 144 per cent. in wet land, in the nine villages surveyed. The rate of assessment for dry land, which, calculated upon the Patwadis' recorded area, stood at

Rs. 3-3-10 per acre, is now reduced to Rs. 0-10-8 per acre. For wet land where it formerly stood at Rs. 27-10-3 per acre, it is now reduced to Rs. 11-4-6 per acre. The following statement, prepared by the Settlement Officer of the Maydak district for the nine villages mentioned as having been surveyed under his superintendence, affords detailed information with respect to this difference:—

Name of Village.	No.	Dry Cultivation.				Wet Cultivation.			
		Area in Acres.		Increase in Area.		Area in Acres.		Increase in Area.	
		Former.	Present.	Former.	Present.	Former.	Present.	Former.	Present.
		1.	2.	3.	4.	5.	6.	7.	8.
1	2	3	4	5	6	7	8	9	10
1	Iksanpalli -	61	22	408	36	347	14	568	0
2	Korlapalli -	16	21	158	12	141	31	881	0
3	Hasan Mahomedpalli -	38	13	409	1	451	28	1,186	0
4	Karampalli -	220	25	865	34	645	9	293	0
5	Andhasampalli -	37	31	124	15	86	22	232	0
6	Chrital -	137	4	437	27	300	23	218	39
7	Boramatapalli -	63	31	408	28	344	37	546	1
8	Arkala -	24	1	126	29	102	28	425	0
9	Budhipalli -	31	14	91	4	59	30	100	13
	Total	631	2	3,111	24	2,480	22	393	4356

CHAP. I. QN. 13.

HYDERABAD.

Moulvie
Mahdi Ali.

Maulavi Shekh Ahmad Husen, Talukdar of the suburban district, bears testimony to the difference between the correct area and that entered in the Patwadis' papers, by bringing forward a statement prepared from the survey records about the Patlur Taluka, showing the results obtained by survey, an abstract of which is given below:—

No.	Name of Village.	Old.	Present.
		Bighas.	Bighas.
1	Rikupal -	210	757
2	Inor -	259	506
3	Yechuram -	193	573
4	Balkal -	133	890
5	Turmal -	168	391
6	Madhuram -	55	129
	Total -	1,018	3,246

In the taluka of Tekmal about fourteen villages have been surveyed, and the result obtained has been a considerable excess of the cultivated area over that recorded. In wet land that area exceeded by 263 per cent., and in dry about 163 per cent. Mr. Swami Rao, Sadr Talukdar, had about fifteen villages of the Kalwakarti taluka, in the Nagar-Karnul district, measured, and the result was that the actual area exceeded that recorded by 41·3 per cent.

In Mouza Chinthalpalli, taluka Kullabgur, the irrigated land, as shown in the Kulkarni's papers, was only 39 acres, while by the survey it was ascertained to be 66 acres, being an excess of 67·64 per cent. In this same village the lands under dry crops according to the Kulkarni's returns were 216 acres, whereas they have been ascertained by the survey to be 402 acres, showing an excess of 85·56 per cent.

Taking the whole Telingana province, the discrepancy in the area of cultivated lands may not perhaps be so considerable as that which is apparent in the Medak district. This much, however, may be safely stated, that, taking the Telingana country as a whole, the excess under the head of wet lands will

probably amount to about 30 per cent. over the recorded area, and the dry lands to about 50 per cent. Calculating on these data, it may be assumed that the average rate of assessment for wet lands is Rs. 9-13-0 per acre, and of dry land Rs. 0-15-4. Under Mogul and Maratha rule, the Maratwadi country was frequently surveyed, and therefore no very great discrepancies exist between the true and the recorded area of each village. The excess in this case may be safely put down at about 15 to 20 per cent. of the recorded area.

It is difficult to state with any degree of accuracy the proportion which such revenue bears to the value of the gross produce, as to do this we must first ascertain the exact gross produce of the land. Now, nothing can be more difficult than to ascertain accurately the gross produce of the different descriptions of soil throughout the country; and, even supposing that this was done one year, the outturn of the next season may upset all our calculations, and render a fresh beginning necessary. The influences at work are so various, and so little to be depended upon for uniformity of operation; the character of the season, the degree of labour spent on the soil, and other contingencies affecting the out-turn of cultivation are so numerous and variable, as to make it exceedingly difficult to arrive at an estimate sufficiently correct to answer our purpose on all occasions. It must be remembered also that economical conditions are constantly changing; that the market value of produce varies from year to year; and that therefore it would be difficult, under any circumstances, to lay down what proportion the revenue bears to the value of the gross produce. I had some experiments conducted, however, under my own supervision, in 1285 Fasli (1875), and some by the district officers in 1286 Fasli, in order to ascertain the out-turn per bigha of the different varieties of crops. Some of the talukdars have also examined experienced cultivators on the subject.

Subjoined is a rough estimate, based on the returns of produce submitted by the talukdars, which will afford an idea of the proportion that the average assessment bears to the produce of all the districts:—

District.	Value of total Food Produce in British Rupees.	Value of other Crops in British Rupees.	Total value of Produce in British Rupees.	Revenue, inclusive of Cesses in British Rupees.	Proportion of Revenue to value of Produce.
1.	2.	3.	4.	5.	6.
Maydak -	Rs. 51,38,380	Rs. 5,44,073	Rs. 56,82,453	Rs. 8,63,158	6·58
Indur -	43,84,994	11,66,228	55,51,222	12,41,263	4·47
Yalgundal -	74,49,824	11,05,131	85,54,955	15,56,061	5·49
Sirpur-Tandur -	11,12,087	8,85,272	19,97,359	1,37,766	14·50
Khammam -	61,80,644	10,41,612	72,22,256	14,52,870	4·97
Nalgunda -	39,87,285	17,19,221	57,06,506	8,97,686	6·36
Nagar-Karnul -	43,99,584	12,55,185	66,54,769	10,41,444	5·43
Total	3,26,52,798	77,16,722	4,03,69,520	71,90,248	5·62
Aurangabad -	1,42,52,078	16,78,278	1,59,30,356	14,64,215	11·87
Beed -	1,39,17,190	33,08,531	1,72,25,721	10,41,351	16·54
Parbhani -	72,93,791	37,51,047	1,10,44,838	10,08,960	10·9
Bidar -	30,94,746	11,76,730	42,71,476	7,43,859	5·74
Nanded -	47,26,246	38,24,716	85,50,962	11,51,977	7·42
Naldurg -	25,77,452	16,88,777	42,66,229	3,52,901	12·08
Gulbarga -	26,57,701	7,91,122	34,48,823	7,65,949	4·5
Shorapur -	41,66,399	19,41,054	61,07,454	6,91,290	8·69
Raichur -	36,13,079	18,40,997	54,54,076	7,92,201	6·88
Lingsugur -	45,35,044	18,21,437	63,56,481	7,57,394	8·12
Total	6,08,33,726	2,18,22,690	8,26,56,416	87,70,097	9·42
GRAND TOTAL	9,34,86,524	2,95,39,412	12,30,25,936	1,59,60,345	7·71

From this statement, as well as from the results arrived at by personal experiments, it is apparent that the proportion the rate of assessment bears to the produce is higher in the case of wet cultivation than in that of dry. The reason for this is to be found in

the fact that the rates of assessment in the former case include both the land tax and water cess, and that the yield from irrigated land is considerably in excess of that from dry-crop lands. If one might hazard a conjecture, I would venture to state that, in

my opinion, founded on personal experiments and on inquiry, the proportion that the average assessment bears to the average produce in the dry-crop cultivation of the Maratha country, in ordinary years, may be set down at about $\frac{1}{3}$, and in the Telingana districts, where wet cultivation is chiefly resorted to, at about $\frac{1}{2}$. In the Maratha districts the revenue instalments are made payable at the following dates:—

	Rs.
15 Azur=26th October	- 0 4 0
15 Bahman=23rd December	- 0 8 0
15 Farvardi=21st February	- 0 4 0

The first instalment covers the kharif crop, the second covers the kharif and rabi, and the third the rabi. Some changes will have to be made in the periods fixed for the realization of the revenues by and by. In the talukas which have come under settlement the revenues are realized as follows:—

The first instalment on or about the 15th of Dai, corresponding with the 24th of November, when the kharif crop is harvested.

The second instalment on or about the 15th of Farvardi, corresponding with the 21st of February, when the rabi crop is harvested.

In villages where no rabi or later crops are grown, the tehsildars are directed to recover the full amount of the revenue due in a lump sum and at once, when the kharif is harvested. But in villages where both kharif and rabi crops are grown, the realizations are made by equal instalments on the dates last mentioned.

In the Telingana districts the revenue instalments are made payable at the following dates:—

	Rs.
15 Azur=26th October	- 0 3 0
15 Dai=24th November	- 0 3 0
15 Ardibehest=24th March	- 0 4 0
15 Amardad=26th June	- 0 6 0

The first instalment covers the kharif harvest. (The jowar crop is not harvested at this time of the year, but all other crops are.) The second covers the rabi harvest; the third the rabi harvest; and the fourth the tabi.

CHAPTER I.—QUESTION 14.

What is the average price of land per acre? What amount of land on an average is sold every year for arrears of revenue and for decrees of court? What quantity of land has been transferred in your district to non-agricultural and non-resident landlords.

PUNJAB.

PUNJAB.

Major Wace.

In the Punjab, in order to keep up to date the record of rights prepared at settlement, every mutation of rights is reported by the patwari (village accountant) of the village in which it occurs to the district revenue authorities, and after a summary inquiry as to the truth of the report, the result is recorded in a brief proceeding, which is filed in the district office with the records, and the village accountant is directed to make a corresponding alteration in the rent roll (jamabandi) of the year. This system has been in force in the Punjab for 20 years past, and the statistics of each year are incorporated for the whole province in statements appended to the annual revenue report.

Accordingly, with a view to furnishing a reply to this question, I have compiled and append the

returns of the eight years commencing 1869-70 and ending 1876-77. The form of the annual returns was changed from 1874-75; and in that year the total mortgages then existing were also ascertained. These returns contained—

A.—Statement of transfers (sales and mortgages) during the five years 1869-70 to 1873-74.

B. Statement of sales for the three years 1874-75 to 1876-77.

C. Statement of mortgages and redemptions of mortgage for the same three years.

D. A statement in which the total mortgages existing on 31st March 1874 are compared with those existing on 31st March 1877.

The most important conclusions to be drawn from these statements may be briefly summarised thus:—

Reference to statements appended.	Transactions.	Total number of Contracts.	Total average thereof.	Consideration paid.			Per-centage which the yearly revenue of the Lands transferred bears to the total Revenue of the Province.	
				Total Rs.	Average amount per acre.	How many times the amount of the annual Revenue of the Lands transferred.	For the whole period.	For one year.
A.	Sales of the 5 years ending 1873-74	25,970	433,133	60,90,490	14	22	1.22	0.24
	Average per annum	5,194	86,628	12,18,098				
B.	Sales of the 3 years ending 1876-77	20,498	270,348	51,04,608	19	27	0.84	0.28
	Average per annum	6,833	90,116	17,01,536				
	Mortgages of the 5 years ending 1873-74	68,235	839,572	1,14,26,998	14	16	3.30	0.66
	Average per annum	13,647	167,914	22,85,399				
C.	Mortgages of the 3 years ending 1876-77	53,593	592,881	95,20,324	16	19	2	0.66
	Average per annum	17,864	197,627	31,73,441				
C.	Redemptions from mortgages during the same period	9,548	149,198	11,73,626	8	11	0.5	0.16
	Average per annum	3,183	49,733	3,91,209				
D.	Total mortgages outstanding in the Punjab on 31st March 1874	139,902	13,14,146	1,87,06,396	14	15	—	6
D.	The same on 31st March 1877	183,974	17,57,829	2,70,53,094	15	17	—	7

Nearly the whole of the land which is the subject of these transfers is cultivated land; very little waste is included.

The conclusion indicated is, that taking the province as a whole, neither sales nor mortgages occur in such numbers as to give ground for anxiety concerning the general prosperity of the agricultural classes. I believe the returns to be fairly complete and reliable; but even were a wide margin allowed for short registration, the same conclusion concerning the general prosperity of the agricultural classes would hold. The most incomplete portion of the returns is probably that of the total mortgages outstanding on 31st March 1874 and 1877.

According to these returns the total lands encumbered with mortgages amount to only 7 per cent.* of the province, and the average annual sales and mortgages together amount to only 1 per cent.

There is also the strongest evidence of a steady rise in the value of land; evidence which is confirmed by the common opinion of the revenue officers of the province, and by many of the records of our administration. For instance, in the Administration Reports of the years 1861-62 and 1862-63† it was noticed with satisfaction that the value of land was steadily rising, the sale value then standing at so high an average as 7 years' purchase of the Government demand; the mortgage value was also said to average 8½ years' purchase. In the same years the aggregate price of the sales reported was about 2½ lakhs, and of the mortgages 3½ lakhs. Compare these figures with the results shown in the table above given. The sums paid for sales have averaged during the past three years 17 lakhs, and for mortgages 39 lakhs; while prices averaged 27 years' purchase of the Government demand for sales, and 19 years' purchase for mortgages. Say, if you will, and no doubt with much truth, that the registration of transfers is now much more perfect than before, nevertheless the average values are probably not far from the truth; and even after doubling or trebling the aggregate reported transfers of 1861-62 and 1862-63, the proof of the rise in the value of the land, and of the increasing confidence with which all classes regard it as a source of profit, will hardly be materially affected.

Between the value of irrigated and unirrigated land, and also between that of land which owing to its situation near a town or village site is usually constantly manured and land not so advantaged, there is of course the widest difference. It is to be regretted that the annual returns make no attempt to show such differences, and within the limits of this reply I can only make a general statement on the subject. Unirrigated land, usually manured and well advantaged by vicinity to a village site in the submontane districts of the Punjab, would rarely sell for less than Rs. 50 an acre; and not unfrequently reaches nearly double that value. Irrigated land is commonly sold for twice the price of unirrigated land of similar quality. And if the irrigated land is well manured, and such as usually bears the richer crops (sugar-cane, turmeric, tobacco, and vegetables, and such like), Rs. 200 per acre is not an unusual price. If the returns had been in such detail as to enable us to distinguish between irrigated and unirrigated land, it would have been very apparent how steadily the price of unirrigated land varies directly according to the rainfall and irrigation. This the returns indicate even as they stand; for example, the following table shows the average price of land in each district; the districts being arranged in the order of their rainfall:—

District.	Rainfall of head-quarters.	Per cent. of Cultivation irrigated.	Average price of Land per acre, 1874-75 to 1876-77.
Kangra	125.6	27	30
Simla	65.1	6	70
Hazara	46.3	10	14
Sialkot	39.0	50	36
Umballa	35.3	18	34
Hoshiarpur	33.7	3	62
Rawalpindi	31.5	2	33
Gurdaspur	30.9	16	33
Karnal	30.4	39	17
Jullundur	29.8	33	76
Gujrat	29.2	13	20
Gurgaon	28.5	19	21
Gujranwala	28.3	70	8
Delhi	25.5	37	44
Ludhiana	25.3	17	54
Amritsar	23.1	39	48
Kohat	20.2	38	52
Ferozepore	20.0	14	14
Rohtak	19.2	13	18
Jhelum	18.6	3	20
Lahore	18.5	37	17
Hissar	16.9	5	54
Sirsa	14.3	3	3
Shahpur	13.0	64	14
Peshawar	12.9	25	11
Bannu	12.0	15	17
Jhang	10.3	69	16
Montgomery	8.7	62	4
Dera Ismail Khan	8.0	32	2
Dera Ghazi Khan	7.2	57	14
Mooltan	6.1	79	22
Muzaffargarh	6.1	65	14

The sale of land for arrears of revenue in the Punjab is, and has been for many years past, unknown. Its sale to satisfy decrees of court is extremely rare.

On the latter point, the rule in the Punjab, a rule which originated with the old non-regulation law, and was continued under the discretionary power vested in the Government by section 327 of the present Civil Procedure Code (as well as by the corresponding provisions of the Code of 1859, which it superseded), has always been* that "no land or interest in land shall be sold without the previous sanction of the Commissioner of the division (Civil and Sessions Judge), and in the case of hereditary or joint-acquired property in land without the previous sanction of the Chief Court." Such sanction is not given as a matter of course, but only on a consideration of the conduct of both parties, and of the whole circumstances of the decree which it is desired to enforce by this extreme process.

The Registrar of the Chief Court is unable to furnish statistics of land thus sold each year; but it is known to be of insignificant extent.

The statistics available show only the total sales of immoveable property of all kinds, and these average 1,724 per annum for the three years ending 1876. Nearly all of these are cases of sale of houses and building sites in villages and towns. Of 1,661 such cases which occurred in 1876, in only 169 was ancestral or jointly acquired property sold. The returns for the same years show that the number of cases in which temporary alienations of land were sanctioned by civil courts for the satisfaction of decrees averaged 502 per annum.

On this point no statistics are available. It may be replied generally that transfers to non-resident landlords rarely occur; that is to say, the purchasers of land, whether agriculturists or capitalists, are almost invariably residents of the village in which the purchased land lies, or of its immediate vicinity. The total amount of land transferred to non-agriculturists since annexation could not be stated, except after inquiries in each district, the expedience of which would be more than doubtful. The annual returns of sales and mortgages (summarised in the statements

* Estimated, not on the acreage, but on the land revenue demand, which is a truer valuation for such a calculation as this than the acreage would be.

† Paras. 201 and 298 respectively.

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* Punjab Government notification, No. 3859, dated 3rd October 1877. Previous thereto the prohibition extended to all immoveable property, i.e., to houses as well as land. But the terms of section 327 of the present Code limit this prohibitory action to land and interests therein.

† Sections 305 and 326 Civil Procedure Code.

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appended) have, since 1874, distinguished the transfers to agriculturists from those to non-agriculturists; and it seems better to be content with the statistics thus available than to institute extensive inquiries concerning the transactions of years previous to 1874. The statements appended show that, in the three years ending 1876-77, the proportions of transfers in which the transferees were respectively, agriculturists and non-agriculturists stood as follows:—

		No. of trans- actions.	Acres trans- ferred.	Total considera- tion paid.
Voluntary sales under pressure of debt	{ To agriculturists -	10,996	127,320	26,25,106
	{ To non-agriculturists -	6,563	80,186	17,87,611
Other sales	{ To agriculturists -	2,113	38,586	4,23,873
	{ To non-agriculturists -	826	26,256	2,68,018
Total sales	{ To agriculturists -	13,109	165,906	30,48,979
	{ To non-agriculturists -	7,389	106,442	20,55,629
	Total	20,498	270,384	51,04,608
Mortgages for debt	{ To agriculturists -	26,082	214,163	39,85,802
	{ To non-agriculturists -	25,085	343,318	51,07,996
Mortgages for improvements	{ To agriculturists -	1,479	15,005	2,09,281
	{ To non-agriculturists -	947	20,393	2,17,245
Total mortgages	{ To agriculturists -	27,561	229,170	41,95,083
	{ To non-agriculturists -	26,032	363,711	53,25,241
	Total	53,593	592,881	95,20,324

Some remarks on the subject will be found in the appended extracts from Revenue Reports. It probably not unfrequently happens that a transferee whose main livelihood is derived from money-lending or petty agricultural banking, the class of man locally described as the banea or village trader, gets himself returned as an agriculturist on the strength of a previously acquired ownership of some other land. But even after allowing for this source of error, it is evident that of 51 lakhs of rupees expended on the purchase of lands in these three years, at least half were spent by agriculturists, and of 95 lakhs laid out

in land mortgages a third were supplied by the same class. Though such facts may not by themselves establish the existence of prosperity among the agricultural class at large, they at least prove that the British administration in the Punjab has succeeded very generally in so adjusting its revenue demand on the soil as to leave to the agriculturist substantial profits; profits for the possession of which both the old agriculturists and those other classes who for generations before our rule thought only of trade and money-lending are actively competing. And, be it remembered, that this is taking place in a country where within the last 30 years agriculture was followed rather as a calling, to which certain castes and classes were then born, than as a profitable occupation; and where a land revenue pitched so high as to make its payment a burden and to absorb all the profits of agriculture had been the normal feature of previous centuries of native rule.

At the same time, lest it should be thought that the above review of the subject is one-sided, I append two papers which give a fair summary of the conflict of opinions on the subject which lately occurred in the Punjab; the one, dated 1st April 1874, by Mr. Justice Melvill; the other the proceedings of the Honourable the Lieutenant-Governor of the Punjab (Sir Henry Davies), No. 4609, dated 23rd December 1874. And it may be fairly argued that the question is not to be decided by per-centages and averages reckoned for a whole province. We here and there find tribes and tracts where the indebtedness and mortgaging is undoubtedly of a very serious character. Some tribes, as the Saiads and the Muhammadan cultivators in the east of the province, seem to be invariably thriftless and slothful, others have been accustomed for centuries to spend their energies in *quasi*-military service and in local rivalries and feuds; the field for all, which, except the first in a very limited degree, our peaceful rule has swept away, and such men are ill adapted by traditional habits for steady agricultural industry, a quality which their forefathers regarded as the mark of men much beneath them in social status.

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EXTRACT FROM SELECTIONS FROM THE RECORDS OF THE PUNJAB GOVERNMENT (No. XIII. of 1876), being papers regarding the ALIENATION OF ESTATES OF INSOLVENT PROPRIETORS TO THE MONEY-LENDING CLASS.

Alienation of Estates of Insolvent Proprietors to the Money-lending Class.

Proceedings of the Honourable the Lieutenant-Governor of the Punjab in the Home Department, No. 4609, dated 23rd December 1874.

Read the following papers:—

From Registrar, Chief Court, No. 1593, dated 28th June 1872, forwarding Minute by Mr. Justice Melvill.

From Secretary to Government, Punjab, to Registrar, Chief Court, No. 2271, dated 28th June 1872.

Circular of the Chief Court No. 3 of 1873.

From Registrar, Chief Court, No. 690 dated 6th April 1874, forwarding opinions of Mr. Justice Boulnois, Mr. Justice Lindsay, and Mr. Justice Melvill.

From Registrar, Chief Court, No. 1643, dated 2nd July 1874, forwarding Notes by Mr. Justice Boulnois and Mr. Justice Thornton.

Annual Report of the Revenue Administration of the Punjab for 1873-74, paragraphs 149 to 150 inclusive.

Remarks.—The question discussed in the above correspondence is one which has of late attracted considerable public attention, not only in the Punjab, but in other parts of India, and may be briefly stated as follows:—

Is further legislative action required to protect the peasant population from the usurer and save their lands from alienation by sale or mortgage to the money-lending class?

2. So far as the Punjab Government is concerned, the subject is not a new one. The impolicy of

leaving the peasantry to the mercy of the usurer, and of permitting too rapid or wholesale dispossession from their hereditary lands of old proprietary tribes, has from the first been recognised, and has largely influenced both its revenue and judicial administration.

3. With regard to revenue administration, light assessments and prompt remission or suspension of demand in unfavourable seasons have been freely granted and it is satisfactory to observe that the indebtedness of the agriculturist, which is said to call for legislative interference, is attributed, not to the undue pressure of the land revenue, but to the extravagance resulting from high credit and the increasing value of land.

4. In the Judicial Department a wide discretion has long been exercised by the civil courts in reducing extortionate claims for interest by money-lenders against agriculturists, and attention has been of late specially called to the subject by the learned Judges of the Chief Court in a circular which will be found amongst the annexures of these proceedings; and under instructions issued by them agricultural implements, including plough-bullocks, gear of wells, houses, and sheds, are exempted from attachment in execution of decrees for debt.

Again, under section 244 of Act VIII. of 1859, temporary alienation of revenue-paying land may be substituted by order of court for sale of such land in execution of decrees for debt under the provisions with which that Act was extended to the Punjab; no ancestral or joint-acquired property in land can be sold in execution save with the sanction of the Chief Court, which is rarely accorded; and under the law

of pre-emption, contained in sections 9 to 14 of the Punjab Laws Act of 1872, every voluntary sale of land within a village boundary is voidable, unless it is first offered to the co-sharers of the village, and, in the event of their declining, to the other members of the village community. It is further to be noted that under the general law of India all written instruments of transfer of immovable property of more than Rs. 100 in value are invalid unless publicly registered; that in regard to mortgages no foreclosure can take place except under orders of court, and in these cases also, in the case of the Punjab, the law of pre-emption applies; and lastly, that the wide definition of "undue influence" contained in section 16 of the Indian Contract Act of 1872 gives the courts the most ample power to prevent the enforcement of agreements which are not absolutely voluntary.

5. It is now to be considered whether any additional safeguards and restrictions are required to protect the agriculturist from ruin.

The necessity for further legislative action was first advocated by Mr. Justice Melvill in 1872, and on his suggestion inquiries were instituted by the Chief Court, with the sanction of the Lieutenant-Governor, in every district in the province; subsequently, in his review of the land revenue administration of 1872-73, the Lieutenant-Governor drew the attention of the Financial Commissioner to the subject, and that officer made it the subject of special inquiry during the past official year. The result of the inquiries thus independently conducted is contained in the correspondence above referred to, copy of which is appended to these proceedings; and it will be perceived that the conclusions arrived at by the superior officers of the province are widely different.

6. Mr. Justice Melvill, to whom the Lieutenant-Governor is much indebted for the attention he has devoted to this important subject, retains the opinion that, notwithstanding the restrictive laws in force, there are still grounds for believing that, owing to the usurious rates of interest charged by the money-lending class, the agriculturists are becoming deeply involved, and are being driven by pressure of creditors to transfer their lands by sale or usufructuary mortgage into the hands of strangers. He considers, therefore, that legislative action is called for, and recommends—

- (1.) That courts should be enjoined to "look behind the terms of a bond so as to unravel the real nature of the transaction and ascertain the principal amount with a view to the adjudication of such a sum by way of interest as might seem equitable in cases where, owing to the absence of free consent, the elements of a perfectly enforceable contract were wanting;"
- (2.) That the term of limitation for claims on account should be extended from 3 to 6 years;
- (3.) That further restrictions should be placed on the voluntary sale or mortgage of lands by providing—
 - (a.) That no transfer of land shall be permitted in payment of debt to a creditor; and,
 - (b.) That no mortgage shall be valid for more than the lifetime of the mortgagor without the sanction of official authority;
- (4.) That so much of the produce of land as represents the cost of cultivation should be exempted from attachment; and
- (5.) Lastly, that imprisonment for debt should be abolished.

7. Mr. Justice Boulnois expresses inability to write at length on the very difficult and important questions raised, but gives an opinion in favour of an extension of the law of limitation and the prohibition of sales of land in execution of decrees held by mahajans for debts, and also of the abolition of imprisonment for debt.

8. Mr. Justice Lindsay, on the other hand, altogether doubts the necessity for legislative action, and Mr. Egerton, the Financial Commissioner, after

reviewing the statistics of transfers of land for the past five years, is of opinion that there is nothing alarming in the extent to which land is being transferred, but that, on the contrary, a natural and healthy process is going on, which should on no account be interfered with.

9. Such being the conflict of opinion amongst the superior officers of the province as to the necessity for legislation, it appears desirable, before discussing the suitability of all or any of the measures proposed by Mr. Justice Melvill, to scrutinise carefully the grounds on which their necessity is asserted, to consider whether the extent of the evil is really such as to call for legislative interference,—in other words, whether there is any sufficient evidence that the agriculturists are to an alarming extent indebted to the money-lender, or that the transfer of lands is being affected to a serious extent to the money-lending class.

10. From a reference to Mr. Justice Melvill's final minute, and the voluminous reports upon the subject which have been obtained from the office of the Chief Court, it would appear that those who believe this to be the case found their opinions not so much upon a comprehensive survey of facts as upon their own experience and impressions, or the opinions and impressions of others. Such opinions and impressions are indeed most valuable, but it is to be remembered that they proceed for the most part from judicial officers engaged perhaps day after day in presiding as judges of civil courts in rural tracts where suits against agriculturists form, as might be expected, the staple of litigation; it is easy to understand that officers so occupied should take a gloomy view of the financial position of the peasantry: but opinions thus formed, being necessarily the result of limited observation, cannot be accepted as conclusive. Moreover, even judicial officers are by no means unanimous on the subject. The difference of opinion among the learned Judges of the Chief Court has already been adverted to; but, besides Mr. Justice Lindsay, Lieutenant-Colonel McMahon, the able Commissioner of the Hissar division, Mr. Gore Ouseley, the Commissioner of Umballa, whose long and varied experience in this and other provinces gives great weight to his opinion, the late Mr. Blyth, whose acquaintance with the feelings and wants of the people was perhaps unsurpassed, have recorded their opinions that no case is made out for further legislative interference. This view appears further to be in accordance with popular opinion, so far as that opinion has been ascertained; for it is stated that Lieutenant-Colonel Mercer, the Deputy Commissioner of the Jullundur district (one of the districts especially mentioned by Mr. Justice Melvill as requiring relief) convened a public meeting comprising representatives of all the classes most interested in the question, namely, Zamindars who were in debt, and had transferred their lands to meet the demands of their creditors, Zamindars who were free from obligation, and money-lenders who held the lands of their constituents by right of sale or mortgage, and money-lenders who had no such interest in the land. The question having been put whether any alteration in the present law was desirable, it was found to be the unanimous opinion that no further restriction should be placed upon the sale or transfer of land than that which would prevent fraud or undue advantage being taken; that any legal prohibition against usurious rates of interest would affect both lender and borrower injuriously, and diminish the market value of land, and that no alteration in the law of limitation was called for.

11. The Lieutenant-Governor's sympathies are entirely with those who would use all reasonable means to protect the agriculturist from extortion, and he is not disposed to attach too much weight to the opinions expressed adverse to legislative interference.

Nevertheless, it appears to his Honour that, before a sound judgment can be formed upon this important question, a far wider survey of the facts is necessary

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Too sweeping conclusions must not be drawn from individual cases; the number of the indebted must be viewed in relation to the number that are prosperous, and the amount of land transferred with reference to the amount transferable. His Honour will endeavour to view the matter from this stand-point.

12. Looking, then, in the first place at the statistics of civil justice, it appears that while the total number of agriculturists in the province is upwards of 10,000,000, the total number of suits for debt brought against this class does not exceed 80,000 in the year, so that in one year one agriculturist out of 125 is annually sued for debt; but a reference to the Blue-Book of Judicial Statistics annually laid before Parliament will show that in England and Wales about one person in 22 is annually sued for debt in the county courts alone, and this notwithstanding the fact that the period of limitation for suits on account is twice as long as in this province.

So far, then, as freedom from debt suits is a test of solvency, the agriculturists of the Punjab must be considered far better off than the inhabitants of England.

13. But again—Is there any valid ground for supposing that the agriculturist is being driven by pressure of debt to transfer his lands to others to any serious extent?

The Financial Commissioner has during the year furnished statistics which afford an answer to this question. From these statistics it appears that during the last five years—

- (1.) Sales of land for debt in execution of decrees of court were almost unknown: only one sale of ancestral land was sanctioned in 1873;
- (2.) That the number of voluntary sales of land averaged less than 6,000 per annum, so that, as the proprietors of land, according to the Financial Commissioner's returns, number 2,006,670, only one proprietor out of 334 parts with land in the year;
- (3.) That the number of mortgages averages less than 15,000 in the year, being at the rate of one mortgage to 133 proprietors.
- (4.) That the aggregate area of assessed land annually transferred by private sale amounted on an average to less than one acre per square mile; that during the past year there were only six districts in which more than one acre per square mile was transferred, and in only a single district more than two acres per square mile;
- (5.) That, on an average, not more than two acres per square mile were annually mortgaged, that last year in only seven districts did the number of acres exceed three per square mile, and of these districts five are among the most prosperous and wealthy in the province;
- (6.) That the value of land is steadily rising in the market, and last year averaged 28½ years' purchase of the Government assessment.

14. Assuming, then as the most unfavourable view of the case possible, that all these transfers of land are made to money-lenders, and in consequence of pressure of debt, it will be seen that the number and extent of such transfers are insignificant, and the only fair deduction to be made from the statistics is that the proportion of extravagance which prosperity and credit naturally produce is, in the Punjab, most creditably small.

But in point of fact there appears no valid reason for supposing that all these transfers, whether by sale or usufructuary mortgage, are made to the money-lending class, or are in consequence of pressure of debts. Some of the sales are doubtless the result of the high prices offered, and many of the mortgages for the purpose of raising capital for agricultural improvements, while the law of pre-emption places a most effective check on the acquirement of village lands by other than members of the proprietary body;

and it is shown by statistics collected in one district of the province that the bulk of the transfers of landed property are made, *not* to village bankers, but to brother agriculturists. So far then as statistics are concerned, it would appear that the apprehensions which have led to a call for legislative interference are at present without adequate foundation.

15. But his Honour does not base his opinion on statistics alone; in the course of his annual tours he has visited every district of the province, and the result of his inquiries corroborates the above conclusion; he has found that, though there may be individual cases of embarrassment due in most cases to personal extravagance, the state of the peasantry is in general eminently prosperous; and he concurs with the Financial Commissioner (who is also well acquainted with every part of the Punjab) in the opinion that the transfers which are taking place do not exceed, or indeed nearly equal, the number which may safely accompany the natural and healthy development of wealth in a country in backward circumstances.

16. There is, the Lieutenant-Governor thinks, great reason to fear that to increase the restrictions on the sale or transfer of land in the manner proposed, or to further interfere with the freedom of contract between the money-lender and the agriculturist, would operate simply to depreciate the value of land as a security, and raise still higher the rate of interest, and, while the measure would fail to teach prudence to the improvident, it would tend to destroy the habit of self-reliance and industry which characterises many of the cultivating races of the Punjab, and is one great cause of its agricultural prosperity. Finally, to extend the period of limitation in debt suits would, his Honour apprehends, only stave off and ultimately intensify the evil it is sought to remedy.

17. Fully sensible of the dangers attending the indiscriminate application of the received doctrines of political economy to unforeseen circumstances, his Honour is, as were his predecessors, prepared to sacrifice, if necessary, a large amount of theory to secure contentment among the people; but it is a matter of congratulation that in the present state of the province no such exceptional action is called for. All that appears necessary is that the civil courts should bear carefully in mind the instructions contained in the Chief Court's Circular, No. 3 of 1873, on the subject of awarding interest. Should cases of individual embarrassment largely increase in any district, it may be perhaps necessary to extend the provisions of the insolvency sections of the Punjab Laws Act to the locality, or to recommend the extension to this province of section 154 of the Land Revenue Act of the North-Western Provinces, enabling the district officer to assume the management of the lands of a disqualified proprietor; but even these measures appear hardly called for under present circumstances. Meanwhile, the subject will continue to receive his Honour's careful attention, and endeavour will be made to obtain more complete statistics on the subject.

18. One other subject touched upon in this correspondence requires notice,—the proposal to abolish imprisonment for debt. This subject is one which must be considered from a wider point of view than its effects upon the peasantry, in whose case, as pointed out by Mr. Justice Melvill, it is rarely resorted to.

But, looking at the statistics of civil justice, it appears that in the year 1873, though the number of applications for execution disposed of was 110,384, in only 6,107 cases were judgment-debtors arrested; that out of these it was only found necessary to detain 708, and that of those detained the great majority were released before the expiration of three months. It is further to be observed that any judgment-debtor who satisfies the court that he has no assets, and has not committed fraud, is at once released, and that information as to the law on the subject is hung up in every civil debtor's ward. Now, having regard to

the fact that the sale of land in execution of decrees is, in the Punjab, practically prohibited, that execution against other property is constantly evaded by concealment of assets or vexatious claims to property attached, and, lastly, the fact that the existing rate of interest charged is said to be exorbitantly high, his Honour is doubtful of the expediency of reducing

the security of a creditor still further, and raising his rate of interest by depriving him of a means of compulsion which is found to be eminently effective, is not shown to be abused, and is so fenced with precautions as to be almost incapable of being made an engine of oppression.

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Minute by Mr. Justice P. S. MELVILL, Officiating Judge, Chief Court, Punjab,—dated Lahore, 1st April 1874.

Replies having now been received to the questions suggested in my memorandum of the 11th June 1872, the substance of those replies is here noted:—

1st question.—“Whether the existing law in regard to interest causes undue hardship to debtors; and if so, to debtors of what class?”

The almost unanimous reply is in the affirmative, and the class indicated is the agricultural class.

The general reasons assigned for the affirmative reply are the necessities of the revenue-paying classes, their extravagance and ignorance, and helplessness when once they have fallen into the hands of the money-lenders.

To the 2nd question,—viz., “Whether, owing to decrees for excessive interest, revenue-paying land has been sold by order of court in execution during the last five years,”—the answer is generally in the negative. There are a few instances in which land is said to have been sold in the manner and for the cause indicated in the question; but these instances are so rare, and the amount of land sold is so small, that they do not affect the general conclusion.

The 3rd and 4th questions are—“The extent to which private alienations of revenue-paying land have been made during the past five years in satisfaction of the debts other than decrees of court,” and “whether such private alienations are attributable to the apprehended action of the courts in decreeing excessive interest.”

The answers to these questions are very indefinite. For some districts the number of cases of transfer is given without specification of the area, and for some districts the return has been given only instead of five; so that it is impossible to specify the extent to which alienations have been made. The present inquiry has not, therefore, resulted in the obtaining of reliable statistics. The causes of the alienations are not stated with any degree of certainty, but most of the replies point to the action of our courts in decreeing excessive interest, and to the heavy costs involved in suits. It is clear, however, that very extensive alienations have occurred in different parts of the Punjab during the five years preceding 1872, and that they are chiefly owing to indebtedness and the extreme difficulty of escaping from it by any other method. Some of the most prominent instances are here noted:—

District.	Alienations during last 5 years.	Cause assigned by Local Officers.
Ferozepore	About ¼th part of the revenue-paying land.	Not the apprehended action of the courts, the alienations being made out of court after decree.
Gurdaspur	Sales 464 cases; mortgages 2,612 cases.	Heavy expenses of law suits.
Jhang	37,565 acres	Pressure of debts and action of courts.
Peshawar	12,000 acres	Interest and costs.
Mooltan	74,697 acres	Action of courts in decreeing excessive interest.
Jhelum	2,104 cases	To avoid annoyance, expense, and indignity of suits.
Kangra	6,553 acres sold; 34,251 acres mortgaged.	Action of the courts in decreeing excessive interest.
Rawalpindi	27,435 acres	Do.
Jullundur	46,850 acres sold; 31,895 acres mortgaged.	Not the apprehended action of the courts.
Gujranwala	20,788 ghumāos sold; 24,760 ghumāos mortgaged.	Interest low. (The ghumāo may be roundly stated as being equivalent to an acre.)
Hoshiarpur	6,909 acres sold; 85,290 acres mortgaged.	About 12 per cent. the total mālguzār (revenue-paying) area of the district. Not the apprehended action of the courts.

The 5th question is—“What was the custom during Sikh rule in regard to interest?”

No general custom applicable to all parts of the Punjab is shown to have existed, but the replies show that a very common custom in most parts of the country was that not more than 50 per cent. on the principal in cash loans, and 100 per cent. in loans of produce, was demandable by way of interest.

The 6th question is—“Whether any, and what, alteration is desirable in the present law of interest?”

A large majority of officers recommend an alteration in the present law, their opinions generally tending to the fixation of a maximum rate of interest that may be decreed by courts, more particularly in cases where the debtors are agriculturists, and to giving the courts the power of making an equitable adjudication of interest, notwithstanding any agreement made by the parties. Some of the most thoughtful reports, however, are against any alteration in the existing law.

2. These reports and statistics of civil litigation prove that the agricultural population of the greater part of the Punjab is very extensively indebted to the money-lenders. The class of money-lenders has increased largely during British rule; and, in addition to the petty banker, who borrows his capital from the old-established bankers, we have the landowners not uncommonly taking the lending money on the same terms and with the like avidity as the professional lender.

3. The cause of this indebtedness is to be found—1stly, in the extravagance of the borrowers; 2ndly, in the rapacity and unscrupulousness of the lenders, more especially those whose profession it is to lend.

The extravagance of the agriculturists is evinced in marriage and other social rites, and in a comparatively reckless way of living. They found themselves a few years after the introduction of British rule in the possession of landed property, which heretofore had been of no appreciable market value, but which now enabled them to raise money at pleasure, and they have too commonly used their new-born credit without reflection, borrowing more money than was fairly needed for the occasion, and squandering the excess in superfluities of living. That the prudent revenue-payer is compelled occasionally to resort to a loan is undeniable. A bad season, death of cattle, or a marriage in the family necessitate the contraction of a loan to enable him to pay the Government demand, to plough his land, or to perform a domestic duty which may not be postponed; but there has been a common disregard of caution in incurring these necessary loans, and there has been also a want of care in devoting the profits in good years to the redemption of debts.

4. The efforts of the money-lenders as a class are now commonly turned to involving the landowner in such a burden of debt that its liquidation is only possible by the transfer of his land to themselves. They are, as a general rule, rapacious and unscrupulous; the sum lent is reduced by preliminary reductions, payments by the debtor are either not credited at all or are credited at less than their value, and exorbitant interest is rapidly piled on interest. The dealings of the money-lending class in the more populous parts of the Punjab may not inappropriately be designated as a system of open plunder; the lenders and the borrowers do not stand on an equal footing; and, as a rule, there is an absence of that free consent on the part of the borrower which is

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needed to constitute a valid contract. The money-lender has superior intelligence, and he takes an unconscionable advantage of the necessity, ignorance, and carelessness of the borrowing agriculturists. It must be recollected that in the Punjab the mass of the agricultural population is composed of small peasant proprietors, and that there are but few large landed proprietors.

In these remarks I am alluding chiefly to the peasant proprietors.

5. On the other hand, it cannot be denied that the Punjab agriculturist is shrewd, and that he has now learnt to deny even just claims, and to invent all kinds of false pleas when brought into court for a debt.

6. A very general opinion is expressed by the officers who have written on this subject, that the main remedy for the existing state of things is to be found in the better education of the agricultural class. I confess that I have but little faith in this. The agriculturist ceases to follow the plough when he has undergone anything but the most rudimentary learning. In fact, he becomes physically incapacitated from doing so if subject to tuition for any length of time. The daily attendance in a room for many hours incapacitates him from enduring the heat of the sun and the hard labour necessary for farming operation, and the hand inured only to the pen becomes unfitted for the plough. It is a well-known fact that the village boy who has undergone a course of Persian, geography, and arithmetic disdains the farrow, and leaves his land to the care of a tenant. I believe that it is not desirable to teach the labouring agriculturists of the Punjab anything beyond simple writing and reading. Could even this amount of education be imparted to the rising generation, a great step would have been gained in putting the agriculturist in a position to hold his own against the banker; but unless attendance at the school up to a certain age is made by law compulsory, it is much to be doubted whether the people will send their sons for instruction. Compulsory education involves a great deal of interference by subordinate Government officials, and the preparation of registers of births, deaths, and marriages, and it would probably not be expedient to introduce such a measure at present.

There will occasionally be found men who desire to raise themselves above the herd, and every facility should be given to them to obtain a superior education; and this can be obtained by resorting to the higher-class schools. But for the agricultural population generally I do not think that the education provided by the Government can be too elementary. If the existing state of agricultural indebtedness calls for a remedy, it must rather be looked for in a measure which shall restrict the credit of the landholders rather than in any rapid improvement of their education.

7. There are still large numbers of the agriculturists who have not become indebted, but it is to be apprehended that these numbers will year by year diminish. There is a strong spirit of emulation abroad in regard to expenditure on social matters; the style of living of all classes is improving; and a general tendency is shown on the part of the agriculturists to be drawn into the vortex of extravagance.

8. The Government is the superior landlord, and, as the recipient of a share of the rent of the land, is directly interested in the welfare of those who are the recorded owners of the proprietary right in land. The Government can hardly be regarded as acting wisely in standing by with folded arms while these people are undergoing a gradual, but no less certain, process of extinction. Although there are no complete or reliable statistics to show how far the ancient landowner has been evicted by the sáhu-kár, I am convinced from my own experience that very extensive transfers of this kind have already taken place, and are now daily taking place, in some of the richest districts in the Punjab, the most prominent instances of which are the Hoshiárpur and Jullundur

districts. It may be said that the capitalist whose hereditary occupation is that of banking will lay out money on the improvement of the land, and in some cases this may be true; but hitherto his aim has too generally been to squeeze as much out of the tillers of the ground as he can, and he does not spend money on the land. His first step is commonly to oust the proprietor from the cultivation. Whether he obtained the land by sale or mortgage, the condition of the transfer is that he shall be put in possession of the cultivating as well as of the proprietary right, or, if his condition of the transfer of the right of cultivation has not been expressly provided, and the courts in consequence refuse to put him in possession of the cultivation, he will take care to see that no doubt is left on this point in future deeds to which he is a party. The result of the present condition of the two parties is, that the hereditary banker, the bannia, sáhu-kár, evicts the cultivating proprietor from his land, and that the latter, driven from house and home, becomes a disaffected and disloyal subject. Let but this process go on for another 50 years, and the Government may find itself face to face with a serious political danger.

9. I, therefore, submit that it is the part of Government to provide a remedy for the evil before it is too late.

10. In my memorandum of the 11th June 1872, I did not intend to suggest any alteration of the law so as to affect the transactions of borrowers and lenders out of court. The whole object of what I wrote was in relation to the action of the courts in decreeing interest. Since that time the book circular of the Chief Court, No. 3 of 1873, has been issued. This circular meets to a very great extent the evil which it was my wish to remedy, and I am of opinion that it would now be sufficient, so far as the action of the courts is concerned, were it to be further enjoined that the equitable principle laid down in the circular should be applied in going behind the terms of a bond so as to unravel the real nature of the transaction, and ascertain the principal amount with a view to the adjudication of such a sum by way of interest as might seem equitable in cases where, owing to the absence of free consent, the elements of a perfectly enforceable contract were wanting.

On a careful consideration of this subject I am not prepared to recommend any alteration in the law of interest where the rate of interest has been agreed upon by the parties concerned.

11. But there are two measures which seem to be necessary. The first is, that the law of limitation should be altered, and the second, that the credit of the owners of land in the Punjab should be restricted.

12. The history of the law of limitation in the Punjab is as follows:—

In the rules issued by the Governor-General for the administration of civil justice in the Punjab, issued in 1849, the period for the recovery of debts on bonds or accounts was 12 years; in 1856* the limit was reduced to six years; 1859† the limit of six years was retained for debt on bond below Rs. 50, and on registered bonds for and above Rs. 50, but it was reduced to three years for debt based on unregistered bonds above Rs. 50 and on accounts; in 1867 Act XIV. of 1859 was introduced, and this has been followed by Act IX. of 1871, which is now in force, and by both these laws the limits for suits on registered bonds is six years, and for suits on unregistered bonds and accounts it is three years.

13. When the change was made in 1859 from the limitation of six years to three years for debts on account or unregistered bonds, there was much apprehension created in the minds of the bankers. I recollect that this apprehension was often expressed to me, and when I have alluded to the subject of late

* Government of India, No. 5238A., dated 24th October 1859.

† Government of India, No. 159A., dated 24th February 1859.

years I have generally found both the banking and agricultural classes opposed to the shorter term of limitation. It may be agreed that a short period for the adjustment of account works to the advantage of the agriculturist, who is thus able to recollect and prove the transactions in which he has been engaged, and that a longer period would result in his finding himself involved in a hopeless well of difficulty; but, although there is truth in this position, it is also true that three years is frequently an insufficient term to allow of a debt being paid off. The margin of profit left to a peasant proprietor, whose holding is ordinarily small, is narrow, and, supposing that he has recourse to a loan in a time of difficulty, such as the failure of the harvest or death of cattle, it all depends on the two next years being plentiful whether he is able to pay off the loan or not. If these fail, the creditor is compelled by the law of limitation to take a fresh bond including the interest due on the first loan, and then the difficulties of the borrower would become serious. Were a period of six years allowed for unregistered and of twelve years for registered loans, I believe that the difficulties of the borrower would be materially lessened. I believe that the knowledge on the part of the lender that he would have a fair time within which to realise his dues would tend to reduce the rate of interest, and that the honest borrower would be able to repay the debt, which now he often cannot do. An alteration of this kind in the law of limitation would be hailed as a great boon by both bankers and agriculturists. A very considerable reduction in the amount of litigation might be expected to result from this change.

14. The most important point, however, is to curtail the credit of the landowners, and this can only be done by placing restrictions on the voluntary transfer of the proprietary right in land. Sales of ancestral land by order of court are practically unknown, in consequence of the Chief Court refusing to sanction them, and therefore the restriction required must be placed on so-called voluntary transfer. The restriction might be that no transfer of the proprietorship of land by private sale should be permitted in payment of a debt to a creditor, whether alien or of the brotherhood, and that mortgages should only be allowed for the lifetime of the mortgagor to a creditor; that no sale or mortgage for a term beyond the life of the mortgagor to parties other than creditor should be allowed without the sanction of the deputy commissioner and commissioner; and that that sanction should not be granted if the transaction is in any way connected with the payment of a debt. By such provisions the mere money-lender would be prevented from getting land otherwise than by fair purchase in the open market; while the legitimate transfer of land by parties not indebted would be practically free.

15. The result of such a course might perhaps be a depreciation in the value of land, but probably not to any serious extent. What is wanted in the Punjab is to prevent the hereditary owners of land from being evicted by the pressure of debt, and if this end is attained a slight depreciation in the market value of land is not of much consequence.

16. The question then arises whether the agriculturists would find the money-lenders willing to advance loans for necessary purposes under these conditions. The fact is that the great body of the lenders are

dependent on the agriculturists for their business, and there seems no reason to believe that they would hesitate to continue their dealings with them, though they would take care only to advance such amounts as there was a fair prospect of recovering. They would not lend in a reckless way, as they now do, in order to hopelessly involve the debtor with a view to eventually getting his land. They would find themselves very much in the same position as in the Sikh time. Nor do I think that the rate of interest would increase. The banking class is the most valuable section of the community, and is entitled to a fair consideration of its interests. The object in what I suggest is to prevent the unfair use of their opportunities.

17. It is a question whether the Government should not, in the event of the above suggestions being approved, set on foot a scheme for redeeming outstanding mortgages held by alien money-lenders, with a view to the reinstatement of the mortgagors in their land. As, however, the measures which I have suggested are radical, and open to many opposing considerations, and the subject is one on which great differences of opinion exist, I would recommend, in the event of the Government not being prepared to take any immediate decisive action, that statistics should be collected each year showing, as far as possible, the state of indebtedness of the agricultural population, and full details of the alienations of land.

18. It would be a good thing if imprisonment for debt were abolished. It but rarely happens that agriculturists are imprisoned on this account, but it seems advisable to remove an engine that may be used for pressing and ruining those who are engaged in husbandry.

19. It is very desirable that some change should be made in the Civil Procedure Code in regard to the attachment and sale of crops in execution of decrees for money. At present the standing crop is not unfrequently attached; a watcher is appointed at the cost of the debtor; and when the grain has been harvested the whole is sold by auction, and the proceeds, after deducting the amount due as Government revenue, are made over to the judgment-creditor. Now, it may sometimes be necessary to attach a standing crop to prevent its being suddenly reaped and made away with, but the attachment should never be made until the crop is about to ripen; and in regard to the appropriation of the yield, it would appear to be in consonance no less with equity than the spirit of the Code to provide that the creditor should only receive that portion of the net produce which remains after paying the Government revenue, or, in other words, that the creditor should get only the proprietor's profit. It would follow from this proposition that the produce of a non-proprietary cultivator could not be touched in execution of a decree for money.

To allow a judgment-creditor to appropriate the whole of the produce that remains after satisfying the Government demands is palpably unjust; for not only is the cultivator thereby deprived of the means of supporting himself and his family, but he is incapacitated from cultivating the land in future without incurring fresh liabilities.

NORTH-WESTERN PROVINCES.

Two statements are appended, of which the first shows the number of sales which have occurred in each district of the North-Western Provinces in the three years 1874-75 to 1876-77 inclusive. The second shows the total amount of property transferred

in the whole province during four years. The amount of revenue transferred is given, but the area of land transferred is not known. Only, therefore, the number of years' purchase of revenue can be given, and not the price per acre. A rough calculation can

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however, be made of the latter by multiplying the average revenue rate per acre by the number of years' purchase of revenue in each district. If the revenue rate in cultivated area is Rs. 2, and the number of years' purchase is 10, then the price per cultivated acre will be Rs. 20.

It will be observed that in the Meerut division and in Gorakhpur and Basti, in which parts of the North-Western Provinces the revenue is low, prices have a tendency to be higher than elsewhere when tested by the number of years' purchase of revenue. The actual price per acre does not, therefore, vary so much as the figures in columns 5 and 9 of the district statements would infer. The rate of revenue in Cawnpore, for instance, is Rs. 2-8-0 per acre, and the number of years' purchase of revenue is Rs. 8; the average price per acre is, therefore, Rs. $8 \times \text{Rs. } 2-8-0 = \text{Rs. } 20$. In Muzaffarnagar the rate is Rs. 2, and the number of years' purchase Rs. 20; the average price is, therefore, per acre Rs. 40. In Bulandshahr the rate is Re. 1-8-0, and the average number of years' purchase is Rs. 25; the price per acre is, therefore, Rs. 37½.

The general result is to show that the price of land ranges from between Rs. 2 and Rs. 12 per acre in the Jahānsi division and Bundelkhand, to a maximum of Rs. 51 in the Basti district and Rs. 54 in Dehra. In the permanently settled districts prices vary from 10s. to 25s. per acre; in the Lower Doab from 18s. to 20s.; in the Middle Doab from 15s. to 25s.; in the Upper Doab from 18s. to 49s. and in Rohiland from 13s. to 34s. It is a significant fact that the value of land in the permanently settled districts, except Jaunpur, is less than in most of the temporarily settled districts.

The best answer to the question as to transfer from the agricultural to non-agricultural classes is to quote a note on the subject compiled in the Board of Revenue, in 1873, for 11 selected districts:—

NOTE ON THE STATEMENTS submitted in reply to the BOARD OF REVENUE CIRCULAR No. 455, dated 25th April 1873, on the transfer of landed property from Agricultural to Non-agricultural Classes.

1. The Board in April last called upon the settlement officers of the 11 districts* for returns showing the extent to which landed property had been transferred during the last settlement from the possession of the old proprietors into the hands of non-agricultural classes. A form of return was prescribed, and it was explained that the term agricultural was intended to include persons connected with land by long association,—such as talukdars, as well as those who follow agriculture as a profession. Under the head of non-agricultural would come classes holding landed property as a source of income, but not the main source of income, whose connection with the land was an accident, not a custom, such as professional money-lenders, Government servants, &c. Replies have been received from all districts except Budaun, where there is now no Settlement Officer. The reply furnished by the collector of Mainpuri, to whom the Assistant Settlement Officer on leaving the district had made over the reference, was obviously incorrect; and Mr. McConaghey, the recent Settlement Officer, has, from the records by him at Naini Tal, supplied the information in another form. The reply from Cawnpore embraces two tahsils only.

2. These statements show the extent to which land has actually been transferred. They do not show the extent to which it is *encumbered*. They give an index to the losses of the old agricultural proprietors during the last 30 years; but they do not give any clue to the obligations of present proprietors.

* Muzaffarnagar, Aligarh, Farukhabad, Mainpuri, Etāwah, Shāhjāhānpur, Budaun, Bijnor, Allahabad, Azamgarh, Cawnpore

3. The result, taking the extreme periods of reference given in each case, is as follows:—

District.	Former area as given in column 4.	Former area held by Agriculturists.	Per-centage.	Present area as given in column 4.	Present area held by Agriculturists.	Per-centage.
Muzaffarnagar.	981,458	872,081	89	999,901	793,150	80
Aligarh (4 tahsils).	767,146	716,249	93	778,818	555,719	71
Farukhabad.	1,047,025	953,923	91	1,027,915	891,528	87
Etāwah.	546,789	495,533	96	574,023	429,410	75
Shāhjāhānpur.	849,411	797,311	94	922,302	769,343	83
Bijnor.	535,328	519,342	97	452,142	390,873	86
Allahabad.	1,667,104	1,546,995	92.8	1,667,104	1,313,177	78.7
Azamgarh.	902,450	872,837	96.7	902,450	835,851	92.6
Cawnpore.	236,740	126,581	53	262,398	111,617	42
Agra (8 tahsils).	1,008,570	806,435	79	990,435	777,508	78
Total.	8,542,021	7,707,287	90	9,377,490	6,868,176	73

According to these returns, the agricultural proprietors, in the area given here, held 18 per cent. less than at the commencement of last settlement. Non-agricultural proprietors, instead of 10 per cent., now hold 27 per cent. of the revenue-paying area. The figures, as above stated, do not show how much is held by conditional mortgage, or how much is hypothecated.

4. The figures, though perhaps not in all cases absolutely correct, are quite sufficiently so for the purpose of the Board. The records from which they were drawn are reliable; and such inaccuracy as there is will arise from the partial absence of records, or from haste in drawing up the statement.

5. The Settlement Officers have in many cases furnished comments on the statements. The results in each district may be briefly noted.

6. Muzaffarnagar.—In this, as in most other districts, the results furnished by different parganas vary widely. In Muzaffarnagar itself the area owned by non-agriculturists has increased from 10,268 to 18,993—from 18 to 32 per cent. In Burhanah it has decreased from 4,949, or 11.75 per cent., to 1,038, or 2 per cent. In Bugrah it has increased from 8,029, or 14.25 per cent., to 15,759, or 28 per cent. In Bhokurherree from 14,060 acres, or 18½ per cent., to 33,199, or 42.75 per cent. Mr. Cadell, who has analysed the causes of transfer in the several parganas, notices that it is the thriftless Muhammadan proprietors, and not the village communities, who have chiefly suffered. He also notes that severity of assessment has had little to do with the transfers. The characteristics of the new class of proprietors are described in paras. 28 to 29 of Mr. Cadell's note. The great mass of transfers took place from 1840 to 1860. In the decade between 1860 to 1870, during which Muzaffarnagar has been under settlement, transfers have been few, and the amount less than the average of the two preceding decades.

7. In Aligarh there have been extensive transfers. In tahsil Atrauli non-agriculturists, who in 1840 owned 8,507 acres, or 4 per cent. of the area, now own 49,187, or 22 per cent. In Hathras the area in their hands has increased from 35,134 acres, or 21 per cent., to 90,983, or 52 per cent. In Iglas they now own 27 per cent. of the tahsil against 4 per cent. at last settlement. The periods during which the transfers were effected differ in the several tahsils, and the Settlement Officer has not offered any detailed remarks. In Atrauli and Iglas they occurred principally between 1860 and 1870; in Hathras between 1840 and 1850; in Khyr (where details of one decade are wanting) between 1840 and 1860.

The Settlement Officer writes that "it may be

"assumed as tolerably certain that not less than about 20 per cent. or one-fifth of the entire area of the district has fallen into the hands of the non-agricultural classes between 1840 and the present settlement." The talukdars in this district have generally held their own, the village communities having been the chief sufferers, a state of affairs precisely the reverse of what has occurred in Muzaffarnagar. So again, while the Settlement Officer of Muzaffarnagar is of opinion that the pressure of the assessment has not affected transfers in Aligarh, it is in Hathras, "which has always had to bear an abnormally heavy assessment," that transfers have been most extensive.

8. In Farukhabad the changes have been less marked: 13 per cent. only of the district is in the hands of non-agriculturists, against 2 per cent. in 1803. It is noticeable that in the three parganas of Shamsabad East, Khakhatmau, and Shamsabad West, in which transfers have been most extensive, the assessment does not seem to have been heavy. The periods into which the transfers are arranged do not admit of any comparison between the several decades. It can only be said that transfers have been less numerous since than before 1837.

9. The officiating Settlement Officer of Etawah has supplied comments on his figures, which have again been criticised by the recent Settlement Officer, Mr. Crosthwaite, who questions the conclusions drawn by Mr. Neale, and apparently with reasons. The greater part of the transfers, comparing decade with decade, occurred between 1840 and 1850, and in each successive decade they have become less extensive. One-quarter of the district, however, is now held by non-agriculturists, whereas one twenty-fifth only was so held in 1840.

10. In Shāhjāhānpur transfers occurred chiefly between 1840 and 1860. In this district, compared with the average of the first two decades, the ratio of transfer has somewhat increased during the last decade. In the Tilhar tahsil the area occupied by non-agriculturists has doubled in 30 years; in Pawayan it has quadrupled. The larger amount of transfers occurred between 1860 and 1870 in tahsil Shāhjāhānpur, and, compared with the average of the two former decades, in tahsil Pawayan. The Assistant Settlement Officer has given a valuable note on the transfers in this district, in which he ascribes to the pressure of the assessments the chief part in the causes of transfer. He divides the parganas into those which are (1) heavily, (2) moderately, (3) lightly, assessed, and shows that the per-centage of transfer, after eliminating disturbing causes in each, has severally been 24.5, 9.4, and 6. The village communities appear to have been the class chiefly affected.

11. Bijnor does not show very extensive transfers, except in the parganas of Mandawar and Bijnor. The Settlement Officer in para. 11 explains the exceptional circumstances of the former pargana, but says nothing of the latter. Since 1860 the amount of transfers has lessened. The Settlement Officer attributes this to the increased prosperity of the proprietors, but it is probably as much due to settlement operations (which commenced here in 1864, and are still in progress), it being a well-known rule that during the progress of a settlement transfers are generally suspended, parties holding a lien on the land preferring to wait until the amount of the new assessment is declared. The chief losers have been the Jats (who are the back-bone of the agricultural population) and the Syuds, who have strong social influence, but are not otherwise of importance. The chief gainers have been money-lenders.

12. In Allahabad, transfers have been extensive in Karrah, Sikandra, Arail, and Muh only; the two latter fully assessed, the two former more or less lightly. Transfers occurred chiefly between 1850 and 1860, and have in the last decade fallen off. The Settlement Officer attributes this to the increasing prosperity of proprietors under a light assessment; but if this is the case, it is not clear why in Nawabganj, Soraon, and Kurari, parganas exceptionally lightly assessed, the amount transferred during the last decade should so largely exceed the transfers in any previous decade. If, as prosperity increased, transfers became fewer, *fortiori* in parganas always prosperous transfers towards the close of a settlement should scarcely occur at all.

13. In Azamgarh, excepting in Nizamabad, transfers have been few.

14. In Agra they have been extensive in Iradatnagar only, while in seven parganas non-agriculturists would seem to have actually lost property. The chief transfers seem to have been during the first decade of the settlement; but the Settlement Officer, who has but recently joined the district, does not offer any criticisms.

15. Cawnpore calls for no special remark; and the Mainpuri return (which is exceptional in form) has been analysed by the Settlement Officer. The Rajput and Ahir village communities have been the chief sufferers—Brahmans, Marwaris, and Bannyahs being the principal purchasers.

16. The conclusion to be drawn from the figures seems to be that, though transfers may have been on a smaller scale than was supposed, they have nevertheless been considerable; that the land is beyond doubt passing into new hands; and that, at the ratio of the last 30 years, the whole of the country would be in the hands of non-agricultural classes in 150 years, if the causes which led to transfer continue to operate. But during the last 10 years (in most districts, years of settlement) the ratio of transfer has decreased; and, if we are to judge by them, the agricultural classes are growing more secure in their property. On the other hand, it is probable that obligations, now not insisted on, will be pressed as soon as the new settlements are concluded. Again, the recent revision of settlement, which has led to a large increase of assessment, will probably lead to an increase in the rate of transfer. Against this may be set the probability that improvidence will grow less as time goes on. The village communities, it may be noted, have suffered more than the talukdars, who have themselves in many cases acquired large properties at the expense of the village communities. The pressure of existing embarrassments, combined with an enhanced demand, will, probably, rather accelerate the rate of transfer among the communities during the next 10 or 12 years.

17. Whether the new men are a source of strength to British rule, and whether it is for the benefit of the money-lending classes that proprietary rights have been conferred and long-term settlements sanctioned, it is for Government to determine. The opinions of the officers consulted differ, it will be seen, considerably, and the verdict against the new men is by no means unanimous. The rate of transfer, should extensive transfer to a new class seem open to objection, does not seem to call at present for very drastic measures; and it seems desirable rather to check than to prevent transfers, and to keep in sight the fact that the village communities are at least as much affected as the large holders, for theirs is the most difficult case to deal with, and their numbers give them great importance.

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TABLE showing NUMBER of TRANSFERS of RIGHTS in LAND PROPERTY by SALE in each DISTRICT of the NORTH-WESTERN PROVINCES for THREE YEARS, 1874-75 to 1876-77, inclusive.

Division.	District.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
		Sales under Orders of Courts.				Private Sales.				Average Number of Years' Purchase of both classes.	Average Rate of Revenue on cultivated Area.	Average Price per Acre, multiplying column 10 by 11.	
		Number of Cases.	Revenue of Property transferred.	Price.	Number of Years' Purchase of Land Revenue.	Number of Cases.	Revenue of Property transferred.	Price.	Number of Years' Purchase of Land Revenue.				
Meerut.	Dehra -	18	Rs. 524	Rs. 21,951	41	139	Rs. 5,150	Rs. 2,38,475	46	43	Rs. A. P.	Rs.	54
	Saharanpur -	490	13,299	1,18,822	9	2,266	43,908	5,84,276	13	12	1 4 0	18	18
	Muzaffarnagar -	265	11,593	1,28,811	11	1,253	34,781	7,96,796	23	20	2 0 0	40	49
	Meerut -	428	9,198	1,74,597	19	1,730	52,703	11,90,557	23	22	2 4 0	27	37
	Bulandshahr -	446	20,847	3,00,042	14	533	22,026	7,58,978	34	25	1 8 0	34	27
	Aligarh -	237	20,022	2,06,169	10	582	59,268	7,73,008	13	12	2 4 0	23	18
	Bijnor -	305	14,816	1,30,639	9	1,330	27,338	6,06,773	22	17	2 0 0	13	18
	Moradabad -	412	27,698	2,84,758	10	1,124	39,662	6,08,962	16	13	1 12 0	13	18
	Bareilly -	399	55,061	4,44,767	8	952	1,55,059	17,40,264	11	10	1 12 0	13	18
	Budaun -	530	14,498	1,80,696	12	1,332	57,934	9,08,192	16	15	1 4 0	19	13
Agra.	Shahjahanpur -	384	36,794	1,67,367	4	8,318	48,425	5,67,459	12	9	1 8 0	13	26
	Muttra -	47	1,985	12,584	6	336	7,752	1,24,375	16	13	2 0 0	25	25
	Agra -	347	17,183	1,35,492	8	641	30,344	4,00,099	13	11	2 4 0	18	24
	Mainpuri -	313	23,321	1,79,656	8	517	34,015	3,21,637	9	9	2 0 0	15	18
	Farukhabad -	790	31,114	2,23,576	7	765	39,379	6,16,478	16	12	2 0 0	12	18
	Etawah -	132	8,919	39,170	4	324	17,890	1,89,990	11	6	2 8 0	6	12
	Etah -	339	25,243	1,87,753	7	531	23,270	3,93,120	17	12	1 8 0	12	6
	Jalaun -	83	11,449	47,794	4	354	20,095	1,73,245	9	6	2 0 0	2	20
	Jhansi -	40	3,145	10,329	3	121	8,829	47,096	5	5	1 4 0	18	6
	Lalitpur -	-	-	-	-	45	2,818	6,240	2	-	0 12 0	2	18
Allahabad.	Cawnpore -	149	20,117	92,915	5	480	42,019	3,91,327	9	8	2 8 0	20	18
	Fatehpur -	253	42,503	2,75,939	6	626	39,786	3,37,841	8	7	2 8 0	18	5
	Banda -	144	26,835	52,280	2	782	54,861	2,31,872	4	3	1 12 0	20	6
	Allahabad -	533	69,700	4,88,138	7	886	77,276	8,40,500	11	9	2 4 0	25	26
	Hamirpur -	76	7,482	19,830	3	711	37,569	1,99,725	5	4	1 8 0	10	13
	Jaunpur -	33	12,485	1,10,456	9	645	39,591	5,18,187	13	12	2 2 0	21	16
	Azamgarh -	124	12,551	1,47,114	11	2,152	50,048	8,12,385	16	15	1 12 0	10	13
	Mirzapur -	95	18,245	68,172	4	288	27,603	4,42,696	16	11	0 14 0	21	51
	Benares -	76	28,424	3,37,493	12	360	66,175	3,39,102	5	7	1 13 0	16	23
	Gorakhpur -	629	12,256	1,50,266	12	2,979	64,678	14,62,390	23	21	1 0 0	17	13
Kumaun.	Basti -	17	894	11,742	13	2,357	20,609	10,84,231	53	51	1 0 0	32	4
	Ghazipur -	205	33,302	4,32,129	4	2,065	50,158	9,47,265	19	13	1 4 0	17	7
	Kumaun -	108	330	10,900	33	735	2,652	1,19,480	45	43	0 12 0	17	7
	rhwal -	67	151	5,410	36	358	848	23,356	28	27	1 0 0	17	7

TABLE showing NUMBER of TRANSFERS of RIGHTS in LAND PROPERTY in the NORTH-WESTERN PROVINCES from the Year 1878-74 to 1876-77 (excluding Oudh).

Year.	Under Orders of Courts.				Private.				Number of Mortgages.
	Number of Cases.	Revenue of Property transferred.	Price.	Number of Years' Purchase of Land Revenue.	Number of Cases.	Revenue of Property transferred.	Price.	Number of Years' Purchase of Land Revenue.	
		Rs.	Rs.	Rs.		Rs.	Rs.	Rs.	
1873-74 -	2,838	2,15,482	15,06,574	7	8,883	4,58,293	56,35,233	12	7,440
1874-75 -	2,488	1,82,104	12,41,304	7	9,653	4,46,215	60,18,995	14	6,609
1875-76 -	2,708	2,00,742	14,38,602	7	10,255	4,71,560	61,58,462	13	6,758
1876-77 -	3,322	2,49,994	22,31,281	9	11,252	4,09,289	66,33,106	16	8,053
Total -	11,356	8,48,322	64,17,761	8	40,043	17,85,357	2,44,45,796	14	28,855
Average for four years -	2,839	2,12,080	16,04,440	8	10,010	4,46,339	61,11,449	14	7,214

BENGAL.

Mr. Toynbee.

Price of land; sales of land, &c.—The answer to this question is given, district by district, in a statement* received from the district officers in reply to a circular asking for the information.

* Page 388.

BENGAL.

Sales for arrears of revenue are, generally speaking, owing to the voluntary default of persons wishing to sell their estates. Purchasers pay a larger price at a sale held by the collector for arrears of revenue than they would pay at a civil court sale, under the idea that they secure a better title at the former. It may

be confidently asserted that in no district in Bengal does the land revenue press heavily on the soil; on the contrary, it is less than half what it would have been had it not been for the introduction of the permanent settlement—*vide* answer to question 13. No information is available as regards the amount of land sold for decrees of court. Both in civil and revenue court sales the amount of the land, or share in land, which is to be sold is not specified. The terms of the sale are that the purchaser shall buy such right, title, or interest as the judgment-debtor may possess—whatever it be. Whole estates are very rarely sold. The majority of sales are of shares in land only, and do not even specify the extent of the share. Until the

passing of the present Land Registration Act, which was introduced with a view of remedying this state of affairs, the same procedure was followed in the collector's office. The registration of a transfer was purely voluntary, and no obligation was on the transferee, if he did register it, to state his specific share or interest. The Act above referred to has not yet been fully worked out, but is now in full operation, and may be expected to be finished within a year. The returns submitted to the High Court by the subordinate civil courts do not even specify the price paid for such interests as are sold by them, and they are quite valueless for purposes of comparison.

CHAP. I. QN. 14.

BENGAL.

Mr. Toynbee.

CENTRAL PROVINCES.

Average price of land.—We cannot give reliable figures. In many cases of transfer of land, perhaps in the majority of cases, there are circumstances and considerations which, without special and minute inquiry, will never come to light: for instance, old debts may be foregone, and the parties may agree to evade the stamp duty by concealing the full consideration, or in cases of auction sales, subject to lien; the bids offered in court may be only a portion of the amount which the purchaser will have to pay, or the decree-holder may have unrealisable claims against the property to be sold, so that it is the same to his pocket whether he bids 600 or 1,000 rupees for the land.

Again, land is not sold at acreage rates. But I think we may safely say that there is much capital ready to be invested in the purchase of land, provided that the land promises to pay at from 12 to 9 per cent. annual income on the investment. This will vary in different districts. In Chhattisgarh, Balaghat, Bhandara and Chanda, land will very rarely fetch such high rates. Competition for land is keenest in Wardha and the Nerbudda valley and Jabulpore.

Amount of land sold annually for arrears of revenue and for decrees of court.—Since the settlement it has not been found necessary to sell any land for arrears of revenue in the collectorate courts. During the last three years the average amount of land sold in execution of decrees of the civil courts has been 119,396 acres, paying a revenue of Rs. 29,776.

Temporary alienations under orders of the courts have been on an average 25,991 acres, paying a jama of Rs. 9,997. We may now look for a decrease in the quantity of ancestral lands thus sold.

Amount of land transferred to agricultural and non-resident landlords.—I have no statistics or information regarding non-resident landlords. I cannot give the quantities of land nor the amount of

consideration, but in respect of transfers to non-agricultural purchasers I recently showed in my registration report that (in 1877-78) there were registered 1,493 documents alienating land by sale. Proprietary rights in whole villages were sold in 207 cases, members of the trading classes acquiring these rights in 93; proprietary right in shares of villages were sold in 354 cases, and the trading classes acquired such rights in 109. Sub-proprietary rights in whole villages were sold in 16 cases, and in four the trading classes acquired these rights; in shares of villages there were 25 exchanges, three of which fell to traders. Minor rights in land were sold in 2,797 cases, traders and bankers purchasing such rights in 746.

The following are the statistics for the two preceding years:—

	1875-76.	1876-77.
Total number of documents alienating land by sale -	2,998	4,075
Proprietary rights in whole villages sold to bankers and traders -	89	110
Ditto to others than the above -	130	110
Proprietary rights in shares of villages sold to traders and bankers -	115	116
Ditto to others than the above -	297	236
Sub-proprietary rights in villages sold to bankers and traders -	3	18
Ditto to others than the above -	6	4
Sub-proprietary rights in shares of villages sold to bankers and traders -	4	17
Ditto sold to others than the above -	8	7
Other minor rights sold to bankers and traders -	655	913
Ditto to others than the above -	1,691	1,972

BERAR.

BERAR.

Mr. Dunlop.

Average Price of Land.

STATEMENT showing a few instances taken at random of Land being sold, and the prices realised during the year 1876-77 in the Ellichpur District:—

Area in acres and guntas.	Rental.	Amount for which sold.	Number of years' Purchase of Rental.
6 28	Rs. a. p. 12 0 0	Rs. a. p. 200 0 0	17 years' purchase.
48 8	84 0 0	950 0 0	11 do. (nearly).
2 31	5 0 0	80 0 0	16 do.
20 23	34 0 0	500 0 0	5 do.
23 17	42 0 0	500 0 0	12 do.
15 15	29 0 0	500 0 0	17 do.

STATEMENT showing Fields in the Ellichpur taluka temporarily alienated (for a year only) for 1877-78:—

Area in acres and guntas.	Rental.	Sum paid by Purchaser for one year's Cultivation, viz., 1877-78.
42 26	Rs. a. p. 98 13 0	Rs. a. p. 386 13 0
19 36	44 2 0	124 2 0
59 6	126 10 0	315 11 0
7 33	28 8 0	74 8 0

3 F 2

CHAP. I. QN. 14.

BERAR.

Mr. Dunlop.

The correctness of these figures is confirmed by the following statement of sales of land in the Amraoti district in the year under report, which had been bought only in the previous year, and were re-sold.

STATEMENT showing a few instances in which Land was recently sold and re-sold at a profit under Registered deeds:—

Land sold.			The same land re-sold for	Number of years' Purchase of Assessment.
Area.	Rent.	Price sold for.		
A. g.	Rs. a. p.	Rs. a. p.	Rs. a. p.	19 years' purchase.
12 23	18 0 0	300 0 0	343 0 0	
16 18	26 0 0	100 0 0	300 0 0	11 do.
100 16	172 0 0	700 0 0	1,000 0 0	6 do. (nearly).
12 32	25 8 0	200 0 0	300 0 0	12 do.
23 6	37 0 0	375 0 0	625 0 0	17 do.
36 34	48 0 0	100 0 0	361 0 0	7½ do.
16 25	26 0 0	90 0 0	260 0 0	10 do.

It is possible that some of the sales given in the first statement may have been fictitious; but this is impossible in the temporary alienations given in the second statement, and highly improbable in the sales and re-sales enumerated in the third statement, which were all registered. For this last statement I am indebted to the courtesy of the Inspector-General of Registration.

Sales of land under decrees of court require the sanction of the commissioner in cases of self-acquired land, and of the resident in cases of ancestral land.

The number of sales effected with such sanction is shown below. I am unable to give the area sold:—

Years.	Number of instances in which Land was attached under decrees of courts.	Nos. of Sales.
1873	752	180
1874	1,042	72
1875	754	138
1876	1,075	179
1877	1,054	79

In the majority of cases in which land was attached it was temporarily alienated for periods ranging chiefly from one to 10 years, a few alienations being for periods of more than 10 years.

We have no reliable statistics as to the transfer of lands to non-agricultural and absentee landlords, and it would be very difficult to obtain them.

Transfers are very frequently merely nominal, made with intent to defeat the decrees of civil courts. A great deal of land is mortgaged to money-lenders.

The same remarks apply with equal force to the Akola and other districts. There is no doubt, however, I think, that the money-lenders are gradually acquiring a considerable quantity of land, which they sublet to agriculturists.

BOMBAY.

BOMBAY.

Col. Anderson.

District.	Average price of Land per acre.	Average amount of Land sold yearly for arrears of revenue.	Average amount of Land sold for Decrees of Court.	How much land transferred to non-agricultural and not resident Landlords.
Kaira	Rs. 200 in rich lands, Rs. 25 in poor	Acres. 225	Acres. No data	Acres. Said to be 10,000 acres.
Broach	Rs. 42-4-0	771, average of 4 years.	185, average of 4 years.	—
Surat	Rs. 88-6-4	186, average of 2 years.	168, average of 2 years.	—
Thana	Rice land from Rs. 10 to Rs. 125, dry crop land from 8 annas to 46 rupees.	1,478	—	1,526
Colaba	Rice land Rs. 120, warkas land Rs. 15.	254	—	220,413.
Khandesh	Good land Rs. 100, bad land nominal	1875-76 there were 336 sales.	—	—
		1876-77 there were 652 sales.	—	—
Nassick	Up to 40 years' purchase	1875-76 there were 100 sales.	—	Much land. Quantity unknown.
		1876-77 there were 158 sales.	—	—
Poona	Garden land near Poona Rs. 200 to 300, dry crop land Rs. 10 to 25.	1875-76 there were 333 sales.	—	—
		1876-77 there were 117 sales.	—	—
Sholapur	—	1875-76 there were 104 sales.	—	—
		1876-77 there were 18 sales.	—	—
Ahmednagar	—	1875-76 there were 79 sales.	—	—
		1876-77 there were 10 sales.	—	—
Kaladgi	Good land 15 years' assessment, inferior 5 years' assessment.	349½	—	Most of the sahukars hold some land; quantity unknown.
Dharwar	Varies greatly	—	—	25 per cent. of the land.

CHAP. I. QN. 14.

BOMBAY.

Col. Anderson.

District.	Average price of land per acre.	Average amount of land sold yearly for arrears of revenue.	Average amount of land sold for decrees of court.	How much land transferred to non-agricultural and not resident landlords.
Canara	Good garden land Rs. 700-800 per acre, poor high land Rs. 20-50.	Acres. About 100 acres yearly.	Acres. —	Acres. —
Ratnagiri	Rice land Rs. 100 per acre, but it rises to Rs. 400 to 500 near large towns on the coast. Warkas Rs. 15 to 50 per acre, according to soil and position.	—	—	No land has been transferred to non-resident non-agricultural landlords.
Sattara	15 times the assessment	About 500 acres. Sales in 1875-76, 39; in 1876-77, 19.	About 1,000 acres.	About 1,300 acres.

The information in this table is most imperfect, but it may be completed with more time. The collectors and judges have been called upon for accu-

rate returns for five years past of lands sold for arrears of revenue and under decrees of the courts.

MADRAS.

MADRAS.

Board of Revenue.

Average price of land per acre.—The Board have obtained from the Inspector-General of Registration a statement showing the selling-prices of land per acre, as ascertained from the actual transactions registered in the several registration offices in the presidency during the last 10 years. It is too voluminous to be attached to these replies, but a statement compiled from it is given below, which shows the price of land in each district for 1875-76, the year preceding the famine, in comparison with the collectors' estimates of the price of "good," "middling," and "inferior" land, so far as reported by them. In some instances the collectors' estimates differ widely from the figures taken from the Inspector-General's statement, but in making any comparison between the two it must be borne in mind that the latter are averages, and that

nothing is known as to the relative proportions of "good," "middling," and "inferior" lands which have entered into the calculation. In Ganjam and Vizagapatam the collector's estimates are evidently too low, as the prices of the "best" wet and dry land given by him are less than the average prices of wet and dry land obtained from the Inspector-General's returns. The Board consider the registration returns to be the best guide available in regard to ordinary selling-prices, though they probably err on the side of understatement, as the full money-value of land purchased is not always shown in the deed of sale. A portion of the consideration may be paid in other ways, or given up for various reasons, or concealed in order to evade the stamp law.

AVERAGE SELLING PRICES OF ONE ACRE OF LAND.

District.		According to Statement submitted by Inspector-General of Registration for 1875-76.			According to Collectors' Estimates.					
					Wet.			Dry.		
		Wet.	Dry.	Garden.	Best.	Middling.	Inferior.	Best.	Middling.	Inferior.
		Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Ganjam	Zemindari	76	55	540	20	15	10	10	8	6
	Government	26	38	—	—	—	—	—	—	—
	Inam	98	51	341	—	—	—	—	—	—
Vizagapatam	Zemindari	169	73	92	3 years' assessment	2 years' assessment	1 year's assessment	Same as wet.		
	Government	181	78	115	25 do.	20 do.	15	do.	do.	do.
	Inam	—	—	—	—	—	—	—	—	—
Godavari	Zemindari	77	65	110	400	200	10	200	100	5
	Government	46	51	109	75 to 110	35 to 50	8 to 20	50	20	1 to 10
Kistna	Zemindari	—	15	100	—	—	—	—	—	—
	Government	46	19	160	—	—	—	—	—	—
	Zemindari	78	—	13	—	—	—	—	—	—
Nellore	Government	56	35	47	Not given.			—	—	—
	Inam	60	31	95	—	—	—	—	—	—
Cuddapah	Government	112	25	60	300	150	50	200	100	20
	Inam	—	—	—	400	200	80	300	150	40
Bellary	Government	72	14	93	Not reported by collector.					
	Inam	—	—	—	—	—	—	—	—	—
Kurnool	Government	79	15	46	112	86	45	26	14	12
	Inam	—	—	—	110	72	63	31	20	11
Madras	Government	—	—	—	1,050	375	75	375	150	30
Chingleput	Government	79	28	92	379 to 606	151 to 227	37 to 75	30 to 37	15 to 22	4 to 7
	Inam	107	104	45	—	—	—	—	—	—
North Arcot	Zemindari	241	91	165	Not reported by collector.					
	Government	—	—	—	—	—	—	—	—	—
	Inam	—	—	—	—	—	—	—	—	—

AVERAGE SELLING PRICES OF ONE ACRE OF LAND—*cont.*

CHAP. I. QN. 14.

MADRAS.

Board of
Revenue.

District.		According to State- ment submitted by Inspector-General of Registration for 1875-76.			According to Collectors' Estimates.					
					Wet.			Dry.		
		Wet.	Dry.	Garden.	Best.	Middling.	Inferior.	Best.	Middling.	Inferior.
		Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
South Arcot	Government	179	100	370	100 to 600	50 to 200	15 to 50	50 to 200	20 to 100	5 to 30
Tanjore	Inam	153	104	231	600	300	100	300	150	50
Trichinopoly	Zemindari	169	44	176		750 to 1,500			10 to 50	
	Government	129	62	142		250 to 1,000			30 to 150	
	Zemindari	140	31	106	629	250	38	147	70	12
Madura	Government	224	38	101						
	Inam									
Tinnevely	Zemindari	71	63	123	Not given by collector.					
	Government	319	61	183						
	Inam									
Coimbatore	Zemindari		22	62				Do.		
	Government	361	65	249						
	Inam							Do.		
Nilgiri	Government		42	88						
Salem	Zemindari									
	Government	114	39	131	100 to 400	50 to 150	10 to 50	10 to 75	10 to 50	
	Inam									
South Canara		273	82	216	100 to 400	50 to 200	25 to 100	50 to 100	25 to 50	10 to 25
Calicut	Government	254	147	164	470	290	155	40	28	15
Tellicherry	Do.	213	57	136	488	323	180	26	19	13
Wynad Taluk					450	350	150	45	35	20

As the selling-price of land varies greatly from very many different causes, it is necessary to be cautious in drawing inferences from the figures given in the above statement. The highest average price for Government irrigated land is Rupees 361 in Coimbatore, while in Tanjore, where lands of unequalled fertility are to be found, the average price is only Rupees 153. The explanation is that in Coimbatore the irrigated area is of comparatively trifling extent (acres 85,642), and what there is is good, while in Tanjore the irrigated lands extend over the greater part of the district, and embrace a wide variety of quality. Similar considerations affect all the other figures in a greater or less degree.

If all assessments were equal in their incidence, it might be expected that on an average the selling-prices would vary directly with the average assessment. Omitting the districts of Godavari, Kistna, and South Canara, for reasons which will be noted below, and arranging the others according to the average value of irrigated land, the order will be as follows:

	Rs.
1. Coimbatore	361
2. Tinnevely	319
3. North Arcot	241
4. Malabar	234
5. Madura	224
6. Vizagapatam	181
7. South Arcot	179
8. Tanjore	153
9. Trichinopoly	129
10. Salem	114
11. Cuddapah	112
12. Kurnool	79
13. Chingleput	79
14. Bellary	72
15. Vellore	56
16. Ganjam	26

Arranged according to the average assessment for the same year:—

	Rs. A. P.
1. Tinnevely	9 7 10
2. Coimbatore	7 5 8
3. Cuddapah	6 12 8
4. Kurnool	6 2 7

	Rs. A. P.
5. North Arcot	5 12 4
6. Salem	5 10 3
7. Nellore	5 7 4
8. South Arcot	5 5 5
9. Vizagapatam	5 3 11
10. Bellary	4 15 2
11. Tanjore	4 13 11
12. Trichinopoly	4 2 9
13. Madura	4 2 9
14. Chingleput	3 10 5
15. Malabar	3 0 1
16. Ganjam	2 14 4

It thus appears that in nine out of the 16 districts the selling-price and assessment go pretty well with each other:—

Coimbatore	(1)	(2)
Tinnevely	(2)	(1)
North Arcot	(3)	(5)
Vizagapatam	(6)	(9)
South Arcot	(7)	(8)
Tanjore	(8)	(11)
Trichinopoly	(9)	(12)
Chingleput	(13)	(14)
Ganjam	(16)	(16)

In two the selling-price appears to be better than it would have been if the assessment had been proportionately as heavy as in the above, viz:—

Malabar	(4)	(15)
Madura	(5)	(13)

Neither of these districts have been newly settled. Of the following five, in which the selling-prices seem to indicate heavy assessment, Salem and Nellore have been settled throughout, and Kurnool and Cuddapah have been settled in part:—

Salem	(10)	(6)
Cuddapah	(11)	(3)
Kurnool	(12)	(4)
Bellary	(14)	(10)
Nellore	(15)	(7)

Even in Nellore, however, the average selling-price is close upon ten times the assessment.

South Canara has been omitted in the comparison given above, as the area and consequently the average assessment is not known, and in the Godavari and

Kistna deltas the whole area is assessed as unirrigated, and a water-rate charged when necessary. The prices realised in South Canara are good,—rupees 273 for wet, and rupees 82 for dry,—and the district is known to be lightly assessed. For Godavari Kistna the rates shown by the registration returns are as follows:—

	Irrigated.	Unirrigated.
	Rs.	Rs.
Godavari	46	51
Kistna	46	19

These rates seem to the Board to be very low, but no satisfactory explanation occurs to them. It will be seen that the collectors' estimates are very much higher, viz:—

	Irrigated.	Unirrigated.
	Rs.	Rs.
Godavari	10 to 400	5 to 200
Kistna	8 to 100	1 to 50

The average selling-prices of unirrigated Government land in the different districts (again omitting South Canara) are as under:—

	Rs.
1. Tanjore	104
2. Malabar	102
3. South Arcot	100
4. North Arcot	91
5. Vizagapatam	78
6. Coimbatore	65
7. Trichinopoly	62
8. Tinnevely	61
9. Nellore	56
10. Godavari	51
11. Nilgiri	42
12. Salem	39
13. Ganjam	38
14. Madura	38
15. Chingleput	28
16. Chaddapah	25
17. Kistna	19
18. Kurnool	15
19. Bellary	14

In the case of dry land no profitable comparison can be made with the average assessment, as the variations between different districts are very trifling, and moreover a large portion of the dry land on which it is struck has no marketable value, but is relinquished at the will of the cultivator when he finds it no longer profitable to hold it.

While on this subject it may not be out of place to show the number of deeds of sale of immoveable property of the value of over rupees 100 executed in each district in the year 1875-76:—

Districts.	Particulars of Lands sold.		Sale Proceeds.	Ratio of extent sold to the total Holdings for every 10,000 Acres.	Average Selling-price per Acre.	Remarks.
	Extent.	Assessment.				
Ganjam	114	136	29	12	0 4 0	This is for Gumsoor taluk only.
Vizagapatam	1,140	2,751	1,080	139	0 15 1	
Godavari	973	2,320	3,834	13	3 15 0	
Kistna	1,409	3,568	2,402	7	1 11 3	
Nellore	1,754	4,145	1,690	19	0 15 5	
Cuddapah	2,664	2,891	2,996	20	1 2 0	
Bellary	2,711	2,983	1,512	10	0 8 11	This is only for nine taluks, viz., Gooty, Tadpatri, Adoni, Allur, Anantapur, Dharmavaram, Penukonda.
Kurnool	1,111	903	1,269	17	0 12 7	

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Districts.	Particulars of Lands sold.		Sale Proceeds.	Ratio of extent sold to the total Holdings for every 10,000 Acres.	Average Selling-price per Acre.	Remarks.
	Extent.	Assessment.				
	Acs.	Rs.	Rs.		Rs. A. P.	
Madras - Government	36	185	2,914	—	81 8 0	Hindupur, and Madaksira. Extent of holdings not known, no accounts being kept.
Chingleput - Government	7,099	18,044	65,986	138	9 4 8	
Chingleput - Inam	277	452	3,403	—	12 4 5	
North Arcot - Government	3,390	7,716	15,310	29	4 8 1	Extent of holdings not known, as the district is unsettled.
South Arcot - Government	665	3,038	15,058	6	22 10 3	
Tanjore - Inam	—	—	—	—	—	
Trichinopoly - Government	983	1,599	5,240	10	10 1 2	
Madura - Government	1,633	2,765	5,896	18	3 9 9	
Tinnevely - Government	1,716	1,720	1,124	7	0 10 6	
Coimbatore - Government	6,335	8,618	4,148	52	0 10 5	
Salem - Inam	601	1,193	5,510	—	9 2 8	
Nilgiri - Government	177	163	376	24	2 2 0	
South Canara - Government	66	216	964	—	14 9 9	
Malabar - Government	7	19	798	09	103 10 9	

Of course, the prices realised at sales of this kind afford no criterion by which to judge of the ordinary value of land in a district. If the cultivator is in difficulties solely through mismanagement, he raises money on the land himself, and, except where fraud is practised, the creditor pays up the demand, and thus, as a rule, only the poorest land is brought to the hammer. Good land is seldom allowed to be sold, unless it has been previously ascertained that the bids can be kept down by combination. In other cases, Mirasidars, notably in the Chingleput district, take up the cultivable waste in their villages ostensibly for cultivation, but really to prevent outsiders from taking up the land; they do not, or cannot, pay assessment, and when the land is sold they have it bought up by one of their relations at prices kept down by combination, and this goes on from year to year. At other times, puttahdars, with a view to defeat the claims of creditors to lands charged with debts, wilfully neglect to pay the Government assessment, and have the land sold for arrears of revenue unknown to the creditors, and bought up by one of their own relations for a nominal price, free of all incumbrances. It is not often, however, that a conspiracy of this kind can be satisfactorily carried through.

The increase of late years in the number of attachments and sales of lands for the recovery of arrears of revenue formed the subject of a thorough investigation as lately as 1875, and the results are embodied in Board's Proceedings, dated 1st April 1874, No. 754, and G.O., 7th January 1875, No. 19. These papers are given in the Appendix, as they are likely to be of interest.

It will be observed that the average extent of land sold for arrears of revenue is nowhere appreciably in excess of one-half per cent. of the total holding, except in the districts of Vizagapatam and Chingleput. No explanation of this is at hand with regard to Vizagapatam, but, as will be seen further on, the collector of Chingleput seems to attribute it to the fact that about 40 per cent. of the land is in the hands of non-resident and non-agricultural landlords, who squeeze all they can out of the actual cultivators, and evade their obligations to Government as far as they possibly can.

No accounts are available of the extent of land sold under decrees of courts, and no attempt has been made to obtain the information from the several courts scattered throughout the presidency, as it is not

likely that the necessary statistics could be collected within a reasonable time. It may, however, be generally asserted that no facts have come to the Board's notice tending to show that the landed classes are being impoverished, or that landed property is rapidly passing into the hands of new men.

Quantity of land transferred to non-agricultural and non-resident landlords.—The collectors of Godavari, Nellore, Madras, Bellary, Kurnool, Kistna, South Arcot, Nilgiris, and Ganjam report that no appreciable portion of land in their districts is in the hands of non-agricultural and non-resident landlords. In Madura it is stated that the proportion is 10 per cent., but that it does not produce any injurious effects, nor have any bad consequences been observed in Vizagapatam, where more than three-fourths of the Inam lands are reported to be in the hands of non-resident and non-agricultural landlords. In Tanjore the proportion is stated to be 10 per cent., and the collector considers that in some cases injury is caused to agriculture by the renters not effecting any improvements in their lands, or by their ill-treating their sub-tenants. The collector of South Canara estimates that one-half of the land may be approximately taken as being in the hands of non-agricultural and non-resident (*i.e.*, resident in the district, but non-resident on their estates) landowners, but states that this circumstance is not considered to have any injurious effect on agriculture or on the tenantry. On the other hand, he thinks that, as these landlords are generally men of substance, they are better able, and more ready, to carry out improvements and increase the rent value of their lands than the other less well-to-do landlords who cultivate their own estates. The collector of Coimbatore makes a similar statement. He estimates the proportion at 5 per cent., and considers that it has not produced any injurious effects, non-agricultural landlords being in general wealthy men who can spend money on their estates. The collector of Cuddapah states that half of the Inams are in the hands of non-resident, and 90 per cent. of the Inams in the hands of non-agricultural landlords, but with no bad results, as the tenants get the lands at a low rent, and make large profits. The collector of Salem estimates the proportion in the case of unirrigated lands at one-fourth, and in the case of irrigated lands at three-fourths. No injurious effects have resulted, as agriculturists who hold lands under occupancy rights from non-resident and non-agricultural classes are generally

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assisted by the latter with funds for the purchase of live-stock, food, utensils, &c. Chingleput seems to be the only district in which finance of non-agricultural holders are have taken an evil form. Mr. Price writes:—"A very appreciable portion of the lands in the district are in the hands of non-resident and non-agricultural landlords. I should roughly say that the per-centage is quite 40, if not more. I consider this to be the curse of the district. Wherever there is heavy waste to be found in the Jammabandi accounts, one is pretty safe in guessing at once that the village concerned is either one, the puttahdars of which are Brahmins, or else that it belongs to a non-resident proprietor. It is the squabbles between these people and their sub-

tenants which cause much of the waste; they collect from the actual cultivators and squeeze them in every way that they can, and then Government has to hunt them down in all directions in view to making them disgorge. The man with capital never has anything to do with these people, as in advancing money or having anything to do with the lands leads in nine cases out of ten to his finding himself involved with landlords whose litigiousness is a bye-word in other districts. I have not seen since I have been in the district half-a-dozen fairly substantial ryots." Taking the presidency as a whole, the Board would say that absenteeism does not prevail to such an extent as to afford any cause for anxiety.

MYSORE.

Good dry land fetches prices varying according to quality up to an average of about 35 Rs. per acre. Wet and garden lands are seldom sold, and when sold the prices are very variable. No separate register of the extent of land sold for arrears of revenue or decrees of court have been kept. The statements sent up for sanction frequently comprise a house, the lands, and other property, but the total collections by sales for arrears of revenue throughout the division have amounted to no more than an annual average sum of Rs. 7,000 and odd for five years preceding the famine, and considerably less than half that amount was realised from land only. I am unable to give any data with reference to land transferred to non-agricultural and non-resident land-holders.

Mr. Krishnaiengar.—The price of land is regulated by its quality and position, and the following is the average in this district:—

Dry - Rupees 10 per acre.
Wet and petty garden " 30 "
Areca and cocoa-nut, " 100 "

The total extent of occupied land in this district is 426,434 acres. The average amount of land sold every year for arrears of revenue is 355 acres, and for decrees of courts, 276 acres. 640 acres of land have been transferred to non-agriculturists and 703 acres to non-residents.

Colonel Hay.—During the last eight years the prices of wet and dry lands in several taluks in this division were as follows:—

No.	Taluks.	Prices of dry land per acre.		Prices of wet land per acre.	
		From	To	From	To
Mysore district.					
		Rs.	Rs.	Rs.	Rs.
1	Periapatam - -	8	16	75	100
2	Nanjengud - -	8	16	100	200
3	Mulvally - - -	4	12	12½	25
4	Yedatora - - -	4	8	100	175
5	Talakad - - -	12	16	100	350
6	Mundiem - - -	1	20	—	75
7	Chamarajnaggar -	8	17	37½	150
8	Gundulpett - -	11	23	65	100
9	Ashtagram - - -	1	70	150	500
10	Mysore - - - -	3	10	50	100
11	Heggadavenkotta -	15	23	50	75
Hassan district.					
1	Nagamangalum - -	1	7	4	25
2	Belur - - - - -	3	4	15	110
3	Harnahally - - -	15	39	4	75
4	Arkalgud - - - -	2	4	250	500
5	Attikuppa - - - -	4	46	50	501
6	Manzerabad - - -	—	—	15	151
7	Chennaroyapatam -	1	4	25	500
8	Narispur - - - -	1	3	25	102
9	Hassan - - - - -	8	20	40	255

CENTRAL INDIA.

Sale of land is unknown in the Central India States. Should arrears of revenue be irrecoverable, Colonel W. Osborne (Bhopal) says the property of the cultivator, except his plough, cattle, and implements, are seized and sold. In Rutlam, Mir Shahamat Ali says the holding is transferred to another

cultivator; but this is rare, as a cultivator is usually helped as long as possible by advances.

Under these circumstances land has no saleable value, but in Baghelkhand it is said to be worth ten times the annual net profits.

MYSORE.

Col. Pearse.

Mr. Krishnaiengar.

Colonel Hay.

CENTRAL INDIA.

Mr. Wingate.

CHAPTER I.—QUESTION 15.

CHAP. I. QN. 15.

What are the wages usually paid to hired field labourers? Are they paid in kind or money? Give the rates as far as you can for the chief kinds of labour in ordinary years. Is the hired labourer usually able to subsist with fair ease on the grain or other payments he receives at harvest and other periods during the intervals between such payments, or is he frequently forced to borrow and forego future payments?

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Major Wace.

Delhi District.—It is customary for the agriculturists to employ field labourers for (1) ploughing; (2) weeding; (3) guarding the ripening crops; (4) cutting them when ripe. They are generally paid in money, to a man 2 annas, a woman 1½ annas, a child of 12 to 15, 1 anna, except in harvest time when they are paid in grain of about the same value. Sometimes a man gets Rs. 2 a month and his food for ploughing or guarding the crops. The persons usually so employed are of the Chamār, Koli, Ajri, Dhanak, Lode, and sweeper castes, who have most of them no other means of sustenance than field labour. Some of them make shoes, mend harness, weave cloth, and otherwise supply the wants of the village population, but they are almost wholly dependent on what they receive from the cultivators as wages for field labour, or in return for those services, all to the same extent connected with field labour. Very few inhabitants of the city Delhi work in the field.

I find little help in estimating the number of persons so employed from the census returns, but would put it at about 20,000, being 3 per cent. on the total population, or 5 per cent. on the population outside the town of Delhi. Such field labourers are not so indebted as the poorer cultivating proprietors, for they cannot easily borrow money, and for the same reason their subsistence between harvests in average years is more precarious. They do not generally get advances from the village traders, nor do they live long on grain or money previously earned, though that does keep them going for some time after the harvest; they work at the preparations for the next harvest, or get an advance from the cultivator who regularly employs them.

Gurgaon District.—The custom of employing hired field labourers is not quite general in this district, as the Jāts and Ahirs, who own about one sixth of the district between them, generally do their field work themselves. The other tribes of landowners and cultivators, however, do employ Chamārs, Dhanaks, Kulis, Julāhās, and sweepers to weed and reap their crop at a money wage of 2 annas for a man, 1½ anna for a woman, and 1 anna for a child per day. Sometimes the wage is given partly or wholly in kind, the value being about the same as the cash wage. When not employed in field labour, these classes earn their livelihood by weaving cloth, making shoes, mending harness, sweeping villages, and otherwise providing for the wants of the villagers, who in this district generally pay them for these services in cash, and not by an allowance of grain at harvest. The census papers of 1868 (Statement IV.) give little aid in estimating the number so employed. I should put it down at 55,000, or about 8 per cent. on the total population.

The condition of these field labourers is not inferior to that of the poorer agriculturists who cultivate holdings of their own. They are not so much indebted, as they have nothing to mortgage; they do not generally get credit from the village trader, but sometimes get wages in advance or borrow a little from each other. In an average year they subsist with ease from harvest to harvest on their earnings during the last harvest and their wages for odd jobs and the profit on their cloths, shoes, &c.

Karnāl District.—1. It is customary to take labourers in a kind of agricultural partnership, where they receive a fixed share of the produce, and bear

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the same share of the expenses of cultivation, and often of the revenue also. These men contribute their bodily labour only, and do much of the harvest work. The employer advances money varying in amount from Rs. 15 to Rs. 50 free of interest, and a further sum, as necessity arises, on interest at 3 pies per 1 rupee monthly. This debt is looked upon as a "body debt" (sarir ká karzāh), and landowners often grumble at our refusal to enforce it as such by compelling the debtor to labour until it is discharged. If the employer is changed, the new employer repays the old one the sum so advanced. The advance is made by a credit with the bania; accounts are settled at harvest time. These people are, as a rule, very slightly, if at all, worse off than the very small owners and tenants so long as they are in full bodily vigour; but as their remuneration varies with the produce, they are wholly dependent upon the season; and when they get old they are unable to find employment. They belong to all sorts of castes, chiefly but not wholly menial, and are sometimes Jāts, Brahmans, &c.

2. The Chamārs often furnish to a given plough one man from a family, who works on much the same terms as above. One member of the family will work one day, and another the next. Most Chamār families furnish one such labourer. They follow at the same time their trade of leather curing and working; and are as a rule well off considering their position. In a famine year the number of cattle which die go far to compensate them for the diminished yield of the cultivation. They are paid at harvest time, and get one-fortieth of the whole yield of the plough on which they work in consideration of their labour, and in addition to what is given for boots, straps, whips, &c. No money is advanced to these men.

3. There is a certain very small number of agricultural labourers hired by the year on fixed pay. They belong to no particular caste, and are chiefly found in the towns and in villages owned by Sayads and others who will not do manual labour. There are very few of them in other villages. They get 9 to 10 maunds of grain a year and their morning meal, or all their food and 0-8-0 a month, or two meals a day and clothing and Re. 1 a month, or Rs. 3 a month, one meal a day and some old clothing and pair of boots every half year; or Rs. 4 a month with or without one meal a day. They always get double pay in the two harvest months. They are of course very poor, more so than the poorest agriculturist.

4. Occasional labour is resorted to at certain seasons, chiefly at harvest time, when rice is being bedded out, and when sugarcane is being cut and crushed. The labourers usually consist of the menials of the village, and of the villagers of the high lands, who reap their yearly grain crop and then go into the low villages to help in the harvest. The wages vary from 3 to 6 or 7 sers of grain a day; and I have known 0-8-0 a day paid at harvest when a sudden hot wind ripened all the crops at once. This class of labourer includes the poorest of the people, and also really well-to-do agriculturists and others, who are attracted by the high wages offered.

5. It is almost impossible to estimate the number of these respective classes of hired labourers. Judging from my settlement figures, I should say, class I. from 3½ to 4 per cent. class II. 3 per cent., and class III. ½ to ¾ per cent. of the adult male population; class IV. is altogether too fluctuating to allow of any esti-

mate. But the above figures are little better than guesses. The adult male population of the district is about 188,000.*

Umballa District.—In this district there are few well-to-do agriculturists, hence they never employ any permanent hired field labourers. It is only for weeding the kharif crops of cotton and makki, and at the rabi for the sugar-cane, tobacco and poppy crops, that hired daily labourers are entertained for two or three days at the most. The rates of wages vary according to the amount of work the labourer is able to perform; the daily labour wages range from 2 annas to 4 annas. At reaping time hired labourers are also required, but they are not paid in money; they receive as wages a load or bundle of the crop they have cut, and which perhaps may yield 4 or 5 seers of grain. There is no special class employed in field labour, but generally Chamārs of the village or other indigent persons who have no particular means of livelihood. This kind of employment at the most never extends longer than one month at a time. At other times, when not engaged in field labour, these employes work in the town as coolies, or perhaps work leather or weave. From the census papers (1868) about 10 per cent. of the whole population of the district, or 103,400 (47 per village on 2,200 villages), may be assumed to work at times at field labour. The condition of this class (field labourers) is no doubt very inferior to that of even the very poorest self-cultivating proprietors, and they never have anything in hand; in short, live from hand to mouth, and in seasons of famine stream out of their villages into the towns, having nothing to fall back upon, and no credit with the village bania, and except here and there, where employed as permanent ploughmen or herdsmen perhaps, they get no assistance from the village agriculturists. In short, in times of distress and scarcity and high prices, these poor wretches are in very evil plight. They have no credit account with the village banker or money lender.

Shiarpur District.—It is customary for the agriculturists of this district to employ paid field labourers. They are principally employed for weeding and hoeing (godai) and for cutting the crop at harvest; employed in weeding and hoeing they are called "godāh"; for cutting at harvest, "laweh."

They receive at hoeing time 2 annas per diem, or 2 annas and food, or sometimes 2½ annas without food, or sometimes they are paid in grain.

At harvest time a very common way of paying them is to give them one sheaf, or half a sheaf, of grain (the sheaf contains on an average about 8 seers pakka of grain) according to the price of grain at the time.

These labourers are principally of the Chura (sweeper), Chamār, (currier), or Julāha (weaver) castes. But Zamindār classes themselves, such as Bhats, Jāt, Saini, Gujar, also occasionally work for hire in the field.

They cannot be said to form a class by themselves in the character of field labourers. Most of them have other means of livelihood, e.g., the Chamār prepares skin and horns for the market, the Churas sweep the village houses, the Julāha has his loom and weaves cloth. At the same time the people who take to labour in the field when opportunity offers are mostly of a very poor class; and have, as a class, difficulty in eking out their subsistence by manual labour of various kinds.

I do not think the number of such persons is less than 70,000, probably more; I estimate it at about 7 or 8 per cent. of the total population of the district.

The above does not take account of ordinary field servants, or "kāmāhs," who are employed by the Rājput landowners generally, and by all the richer Zamindārs. These are employed all the year round, and engage in all field operations. They receive Rs. 1-8 and Rs. 2 per mensem and food and clothes.

* The census returns say 106,165.

I think this class, i.e., "kamah," may amount to about 10,000 persons, or 1 per cent. of the population, probably not more.

The position of both, whether kamah, i.e., regular labourers, or godāh or laweh called in at harvest or weeding time, is distinctly inferior to that of the poorer agriculturists who cultivate holdings of their own, because their livelihood is somewhat more precarious and they have not security of land or occupancy right, on which money can be raised by those who cultivate holdings of their own.

They live as a rule from hand to mouth by the daily labour of their hands, and cannot get much credit with the village trader.

Sialkot District.—It is customary for Zamindārs and other landowners of good position to hire labourers for the cultivation of their fields; the work in some instances being such as to require the permanent employment of labourers throughout the year; and in others they are employed for a time only just as necessity arises for their services. The permanent class of labourers are paid in kind, viz., 20 seers on every māni (= to about 12½ maunds kacha) of crop sown, besides food three times a day and clothing. The other class, or temporary labourers, are paid in cash at the rate of Re. 1 per month and food and clothing in addition. The persons usually employed are of the Chura, Meo, and Bhatwar castes, and principally resort to this sort of work for their sustenance, though, in case no such employment could be got, they follow their own special avocations elsewhere. The private servants of the landowners, such as the washerman and water-carrier, also labour in the field, but receive no extra remuneration.

When the sowing and harvesting seasons arrive extra labourers are hired, and are paid generally according to the crops they work at; those employed in the sowing of munji, a kind of rice, get 5 seers of grain daily each, and the harvesting labourers get 1 "bhari" or sheaf of whatever grain they cut, and the out-turn of which never exceeds 10 seers; and those employed in the weeding of sugar cane, cotton, and maize get food twice a day, or in lieu 1 and 1½ seer of grain per diem each, or 2 annas in cash, whichever they choose to select; and those employed in ploughing get the same wages as the last mentioned. The total population of the district is 1,005,004, out of which 183,291* are employed as field labourers, or a little over 18 per cent. of the total population. The condition of the field labourer in comparison to an agriculturist who cultivates himself is decidedly inferior in respect to affluence; he cannot subsist entirely on his labour in the field, and he is obliged to take some other work as an additional help. The labourers can generally obtain money from the village banker when they need it, and they settle with him when the harvest is reaped, or whenever they happen to have sufficient wherewith to do so.

Mooltan District.—Hired labourers are employed by all the richer Zamindārs, who are above following the plough themselves, for their "khud kashit"† lands. They are employed for all farming operations, and receive wages sometimes in kind, sometimes in money, sometimes in both, amounting to from Rs. 3 to 5 a month. They are of all classes, except Sayads and Brahmans; they cannot be said to form a class apart; they are the outskirts of the tenant-at-will class. A tenant loses his bullocks or gets into trouble, and he works as a labourer till he can recover himself. On the other hand, a Zamindār takes a fancy to a labourer who has worked for him for some time, and he gives him some lands, advances him money for bullocks, and sets him up as a tenant. Sometimes, too, a small proprietor meets with a temporary difficulty; in the Rawa,‡ in long continued drought cultivation is impossible; the

* This is clearly an excessive estimate. The total adult male agriculturists numbered only 142,819. There cannot be more than one labourer to every agriculturist.—E. Wace.

† Their own home farm.

‡ Dry lands, not irrigated nor alluvial.

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proprietor then sends his cattle to graze in the Bár and goes to work as a labourer until better times return. These labourers generally live on their wages with ease; they may run up petty scores for food in their bazár, but they cannot get into serious debt. But their condition is inferior to that of the poorer tenants, inasmuch as it is generally when a tenant is ruined that he becomes a day labourer; as long as a man is a tenant he has no want of the actual necessities of life, nor has the labourer, as a rule, but he may have at any time,—at least there is the possibility of this, but I have never known it to occur practically. The demand for labour has always been in excess of the supply, and the agricultural labourers work on steadily all the year round.

Jhang District.—It is not customary for the agriculturists of this district to employ hired field labourers. Such labourers are very few. The mass of cultivation is carried on by tenants-at-will paying grain rents of half produce. Many of these tenants are given advances (known as takávi) of money, oxen, seed, &c., when they first commence to cultivate their landlord's well. Cultivators of sailáb lands are not given advances. The wages of a hired labourer consist, as a rule, of the following items:—His food daily; Rs. 1-8 cash per month; 2 chaddars, 2 loin cloths, 2 pagris, 2 pairs of shoes, and 1 blanket per annum. The material item is of course the food of the labourer, and this is sometimes very cheap and sometimes equally dear. These labourers are, as a rule, poor Játis. They do not practice any craft. They get their living entirely in this way. As there is usually a considerable demand for labour, there is no fear of their starving if they will work. I cannot give any estimate of the number of these labourers. They are very few—probably not more than 1 or 1.5 per cent. of the total population.

These labourers, so long as they are in employ, are well off, but the nature of their wages prevents their

saving anything. They live better, i.e., have better food, than the poor agriculturists who cultivate their own lands or the tenants-at-will paying bátái. They are generally unmarried and without any encumbrances.

Peshawar District.—In this district hired field labourers of three descriptions are employed.

(a.) These who receive monthly wages which amount to Rs. 4 or 5 in cash without food, or 1-8 or Rs. 2 in cash along with food. They are employed in every description of agricultural work.

(b.) Those locally known by the name of *charahar*, who are indebted to their masters for sums ranging from Rs. 30 to 150, and are under engagement to give their services as agricultural labourers till such time as the debt is paid off. Plough bullocks, seed, &c. are furnished by the employer. These labourers are paid by a share of the crop in kind, which is usually from $\frac{1}{4}$ th to $\frac{1}{10}$ th. They feed themselves.

(c.) The labourers who are specially employed as cattle herds or crop watchmen. The former are paid at harvest by receiving 15 seers of grain (barley or joár) for every head of cattle grazed, or sometimes the payment is calculated not in the cattle, but on the owners or their houses. The latter are also paid in kind at harvest; they receive 1 seer per maund of grain out of every crop.

There is no tribe specially devoted to these occupations. When not engaged in agricultural work, they are ready to do any sort of miscellaneous labour. Their numbers are about 2,854, which is a per-centage of 0.55 per cent. of the total population. There is no material difference in the condition of such labourers and that of the poorer agriculturists who cultivate holdings of their own. The *charahars* are generally in debt; they borrow money under promise of paying it back at harvest, but with that exception the labourers are well able to live upon their earnings. Those who watch crops are, as a rule, very well off.

NORTH-WESTERN PROVINCES.

In the Muttra, Mainpuri, and Cawnpore districts cash payments would appear to be most in vogue, but elsewhere the replies indicate that in ordinary years payments are mostly made in kind. During the past year, however, either owing to the fluctuating nature of grain, rates, and their height, or owing to zamindars having less grain on hand than usual, payments have been made in cash. Such payments have been at lower rates than what the payments in kind of ordinary years would represent in cash. Necessarily, save where Government relief works came into competition, people were anxious to work at any rate. In May last, when discussing with a zamindar the *pros* and *cons* of a bund upon the making of which I had set my heart, he remarked with emphasis, "Now 'is the time to get the work done, as labour can be 'got so cheaply.'"

The hired labourer ekes out his gains at harvest time by selling grass, cutting wood, repairing houses (an operation always carried on at slack seasons, when the owner can sit all day, taking care that the labourer does his full tale of work), carrying loads of grain, wood, cowdung fuel, fruits, &c., to market; protecting fruit, groves, or ripening fields from the depredations of birds and other thieves, &c., &c.

A labourer's earnings depend of course on his industry, and in ordinary years there are always fair earnings to be got for the industrious. A lazy fellow who only works when forced to do so, for as much as will keep him alive, is sure to be well known in the village, and to find it impossible to borrow or forestall. The industrious borrow and forestall as much as they can, not to gratify personal extravagance or tastes, but to meet caste obligations in the way of marriages, burials, funeral rites for their ancestors, &c., obligations which the most honest of the poor would rather face death than attempt to evade. It may safely be stated that the majority of industrious labourers owe some sum, small or great, and

are ever ready to borrow or forestall when credit is to be got. That credit is given so generally is due to the solemn obligations resting on children to discharge the debts of their fathers.

In towns a numerous class of money lenders are to be found who deal with the labouring poor almost exclusively, lending small sums of Rs. 2 or so, at high rates of interest, repayable by daily payments of perhaps as little as a pice. For the collections of these petty sums Brahmins alone are employed, a fact due no doubt to the superstitious feeling on the part of Hindus against refusing a Brahman's reasonable request, and a relic of the times when Brahmins were sent to sit "dharna" at the doors of impracticable debtors.

These collectors go their daily rounds, and for each default "chalk" up a mark over the debtor's door-post. It would surprise many of those who hold a low opinion of Asiatic morality to see how large an average of good faith exists on the part of the money lender, who keeps the only written record of payments; on the part of the collector, who commits his collections to memory; and on the part of the debtors, who never venture to tamper with the writing on the wall.

These loans are sometimes contracted for the purpose of carrying out some small business or petty contract, but mostly for marriages, and very often to help some neighbour neither related by blood nor connected by caste, but simply without credit.

The labourer's life is hard enough in all conscience. One of the last scenes is frequently a visit from his various creditors, who come and make their demand while he lies on his death bed, so that the heirs of his cooking pots and mud hut may be advised. It is a common plea on the part of the heirs-at-law when resisting a claim against the property of a man lately dead, that the creditor failed to make any claim while the man lay dying.

STATEMENT showing Rates of chief kinds of Labour in ordinary years.

District.	Weeding and Digging, &c.	Irrigating.	Harvest operations.	Artisans.	Ploughmen or permanently employed Servants.	Remarks.
Meerut -	In cash 2 annas, usually the value in kind 6 or 7 pice -	2 annas -	1 bundle in 20, 1 in 14 for cotton 1 do. in 20 -	4 annas a day -	-	Sugar-cane labourers 4 annas a day.
Mainpuri -	-	-	3 seers extra of harvest labour -	4 annas to 5 annas -	Rs. 2-8-0 per mensem, with a blanket occasionally. Rs. 3 per mensem -	Sell grass in off seasons.
Muttra -	Rs. 3 a month or 2 annas a day -	-	5 seers a day, and straw with it 1 in 20 -	-	Rs. 2-8-0 or Re. 1 and food Rs. 3 per mensem.	Eke out by sale of grass, buildings, &c. No other particulars given.
Etawah -	1 anna 6 pice -	2 annas and food -	2½ annas a day -	-	-	Get advances for labour from zamindars.
Aligarh -	1 anna 6 pice to 2 annas in kind -	-	1 in 20 -	7 annas to 7 annas 8 pice -	6 annas a day for hire of man and bullocks.	Re. 1 cash and a blanket per annum extra to permanent servants.
Farrukhabad -	2 annas usually, but this year 1 anna 6 pice -	-	1 in 20 -	-	1 anna 6 pice -	Labourers get 1 bigga ploughed and sown for them free.
Muzaffarnagar -	Rs. 3 a month 2½ seers, grain -	1 to 2 annas and a meal -	1½ to 2 seers or 2½ annas -	-	9 pie -	This year payments have been in cash. A blanket and pair of shoes annually to regular servants.
Bulandshahr -	1 anna to 2 annas 6 pice -	¾ of a seer, with chabena and cane-juice. 1 anna -	¾ seer gur daily when working at sugar-cane as well as wages.	3 annas -	Rs. 2 to 3 per mensem -	In the bhábar ¼th of the crop.
Budaun -	2 annas to 3 annas -	-	2 seers wheat, or 4 seers coarse grain -	-	-	Forestal their earnings, pledging their labour.
Moradabad -	1½ to 2 seers, with chabena extra -	-	2 annas to 3 annas -	7 annas 8 pice -	Rs. 1-3-0 per mensem -	Hire of 7 yoke of bullocks 4 annas a day, and an occasional blanket.
Cawnpore -	1 anna or 2 seers coarse grain -	-	1 in 20 -	16 seers on each plough -	Rs. 2-8-0 ditto. Rs. 2-8-0 and food -	Eked out by carrying loads and selling grass.
Mirzapur -	2 to 3 seers, this year 5 pice -	-	1 in 16 rabi, 1 in 13 kharif -	Well diggers, 2 annas -	4 a bigga with seed, 3 mds. at rabi, and 3 at kharif.	House repairing, sell grass, carry loads.
Ghazipur -	1 anna or 2 seers coarse grain -	-	1 in 20 -	2 annas -	Rs. 2 to 2-8 per mensem -	House repairing in the slack season gives work.
Benares -	1 anna or 2 seers coarse grain -	-	1 in 16 -	2 annas -	Rs. 2 to 2-8 per mensem -	5 pice a day wage during scarcity.
Gorakhpur -	1 anna to 1 anna and 6 pice -	-	1 in 16 and 5 seers treacle -	-	Rs. 2 per mensem -	A blanket, or petticoat for the women.
Tarai -	No regular labourers; people help each other in all farming operations.	-	-	-	-	-
Kumaun -	2 seers a day of millet, 2 annas in tea gardens -	-	-	-	-	-
Garhwál -	1 anna to 1 anna 6 pice kharif, 0-1-6 to 2 anns. rabi -	-	-	-	-	-
Jalaun -	9 pie, men; 6 pie, women -	-	-	-	-	-
Lalitpur -	1 anna to 2 annas -	-	-	-	-	-
Shahjahanpur -	This year 5 pice, 1 anna to some, or 2 seers -	-	-	-	-	-
Lucknow -	This year 5 pice, or 3 seers kodo -	7 pice -	-	-	-	-
Bara Banki -	1 anna 6 pice with ¾ seer chabena -	-	-	-	-	-
Unao -	This year 5 pice, usually two seers -	-	-	-	-	-
Rae Bareilly -	1 anna 3 pice to 1 anna 6 pice -	-	-	-	-	-
Parbharh -	1 anna to 2 annas; cultivators afford mutual help -	-	-	-	-	-
Fyzabad -	1½ seer -	-	-	-	-	-
Gonda -	1 anna a day -	-	-	-	-	-
Kheri -	-	-	-	-	-	-

CHAP. I. QN. 15.
NORTH-
WESTERN
PROVINCES.
Capt. Pitcher.

NORTH-
WESTERN
PROVINCES.
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CHAP. I. QN. 15.

BENGAL.

Mr. Toynbee.

The rates of wages of agricultural labour are given, district by district, in column 9 of the statement appended to question 13. Harvest labour is, as a rule, paid for in kind throughout Bengal; ordinary field labour at other seasons partly in money and partly in kind. The hired labourer working near his own village is able to subsist in ordinary years on the wages he receives for his labour; but it is a bare subsistence, and little else; for purchase of clothes, for a wedding, or funeral, or any other similar expenses, he has

BENGAL.

generally to borrow either from his landlord or employer, or from the village mahajan. He is in a chronic state of poverty and indebtedness, and in many parts of Bengal is little better than a slave attached to the land on which he squats. For skilled labour the rates are generally at least double those paid for field labour, and such labourers as are willing to work away from their houses on public works earn very considerable sums.

CENTRAL PROVINCES.

Mr. Nicholls.

CENTRAL PROVINCES.

Saugor, Major Bloomfield.—An agricultural servant engaged for the 12 months is paid:—

- Rs. 2 per mensem = 24 Rs. per year.
 - 1 blanket, value Rs. 1,—in the rains.
 - 1 quilted jacket, value Rs. 1 to 0-12-0,—in the cold weather.
 - 2 pairs of shoes, value 0-6-0 to 1-0-0,—in the year.
 - 2 rotis, made of $\frac{1}{4}$ to $\frac{1}{2}$ seer of flour,—every day.
- Flour is generally $\frac{1}{2}$ anna per seer, so this would cost $\frac{1}{2}$ anna daily, or from $365/8 \div 16 =$ Rs. 2-8-0 to say Rs. 5-0-0 a year.

At sowing time $2\frac{1}{2}$ seers of the grain sown. At harvest one bundle of grain, with straw (about $2\frac{1}{2}$ seers of grain), every day during the harvest.

Women employed on daily wages earn about 2 sheaves of grain (value about 2 annas) daily, or about $2 \times 30/16 =$ Rs. 3-12-0 per mensem in the harvest time.

Piece work (called kutha) is given at harvest time, the reaper being given one bundle in every 20 cut, or 5 per cent. In this way a man can earn four bundles, value about 1 anna each, or 4 annas to 6 annas a day.

At Chilora, 10 miles from Saugor, the people are said to get $2\frac{1}{2}$ to 3 Rs. per month, but everything else the same.

At Baroda, 14 miles east of Saugor, they receive Rs. 2 to 2-8-3 per mensem, with miscellaneous articles, as above.

At Bali, 12 miles east of Rahli, if employed for a short time, they get Rs. 3 per mensem, or for all the year round 30 seers of wheat (value 1-4-0) and 30 seers gram (1-0-0) or Rs. 2-4-0 per mensem, besides the miscellaneous articles mentioned above.

It appears that much of the farm labour in Bilaspur is performed by partnership arrangements.

One way is where the labourer gets after harvest one quarter of the total produce. In other cases he has assigned to him about an acre or an acre and half of land, for which the employer pays the rent, and on which the labourer works in his spare time. Apparently he works two days on the employer's land, and on the third day, using his master's cattle, on his own patch of ground. He can get money advances without interest, but for grain lent to him he repays with sawai in kind. The wages of a woman or boy, paid in grain, is equal to 3 pice to 6 pice, according as grain is selling cheap or dear. The quantity does not vary, being two seers of unhusked rice a day.*

Raipur.†—The purely labouring classes in the district form a very small minority of the population, as almost all have some small plot of their own, which they cultivate with their own or hired bullocks. At the head of the labouring classes stand the ploughmen, who receive as wages one quarter of the crop they plough. This high rate of payment was fixed in times long past,

* NOTE.—My informant is Beehi Lal, late forest darogah of Bilaspur, an intelligent man, who had been very many years in the district, now a darogah in the Excise Department. I have also my own recollections and the Raipur Settlement Report to corroborate.

† From Mr. Hewitt's Settlement Report, 1859.

when grain was much cheaper than at present, and is retained now owing to the continual advance of this class to independence. As soon as they scrape together enough money to buy a pair of bullocks they set up on their own account, and this constant upward movement keeps up the rate of wages, though grain is now nearly 12 times dearer than it was 20 years ago. In former days almost every ryot who owned four bullocks kept his ploughman, but of late years their services have become too costly a luxury for any except rich ryots and Malguzars.

The rest of the labouring classes consist of those who depend upon occasional jobs, and are called locally "bhootiar." When employed on farm work they are paid as follows:—

- For weeding—one kata of paddy daily= $3\frac{1}{2}$ seers.
- For cutting—two katas do.
- For treading out—two katas do.

Rice huskers and owners of oil presses are not paid wages, but do the work by contract, the rice husker giving eight katas of husked rice (chawal) for 20 katas of paddy, and the oil pressers giving oil in the following proportions:—

- One seer of oil for five seers of linseed.
- One " of " for four " tilli.
- One " of " for four " castor oil.

One seer of seed, or about 20 per cent., being supposed to be his profit, the same as is given to the rice husker.

Rate for the chief kinds of labour.—The wage of domestic servants have increased greatly of late years. In 1861 Tahsil chaprassis got 3 Rs. in cash a month, a good syce could be got for that monthly wage*; a day coolie got $1\frac{1}{2}$ anna, a woman 1 anna.

Tahsil chaprassis now get from 5 to 6 rupees, with compensation for exceptional dearth of grain, and an expectation of pension, and fitting men could not be obtained for less. A good syce can now hardly be got for Rs. 6 a month.

The following rates are now paid in the Ramtek pán gardens for occasional help: a man $2\frac{1}{2}$ to 3 annas, a woman 2 annas, a child $\frac{1}{2}$ anna; where the engagement is for the month a man gets from 4 to 5 rupees a month, varying with his capabilities, a woman or a middling sized boy 2 annas.

Hamals engaged in loading railway waggons when in steady employ get Rs. 7 a month, but generally hey work in gangs on contract work, and can earn up to Rs. 12 a month, and in times of pressure more than double this amount.

Ordinary village carpenters, masons, and smiths earn in Nimar Rs. 20 a month, in Nagpur and Wardha 15 rupees, and 15 also in Chhindwara, Jubbulpore, Hoshangabad, and Sironcha; while in Bhandara, Chanda, Seoni, and Mandla Rs. 12 is the ordinary rate. In Saugor and Damoh their earnings are from 8 to 9, and this is about the rate for Chhattisgarh.

* NOTE.—Wheat was then selling at Jubbulpore at 64 seers rice from 32 to 48 seers, for a rupee.

The wages paid for unskilled labour in the Empress Spinning and Weaving Mills at Nagpur are—

- Able-bodied men - 6 to 9 rupees a month.
- Women - 3 to 5 " "
- Boys (who do most of the work) } 4 to 5 " "

There are still very few of the Koshti (the weaving class) who came for employment at these mills.

Skilled hired servants working for the native cotton weavers (koshtis) in the towns of the Nagpur district earn from Rs. 6 downwards. As a rule, these men have served an apprenticeship.

The servants of mahajans, who run errands and do the work of dunning, get Rs. 4 a month and perquisites. Their stipulated wages have doubled within the last 15 years.

I am fully satisfied that the rise of wages has been general, and has been continuous since 1862. The increase has been fully 33 per cent. for agricultural labour.

I think it may be said that a steady villager of good character and some knowledge of farm work, and in good health, need not be without employment at any time of the year. And there is always spinning, cotton cleaning, husking rice, and cleaning grain open to their wives and children; and for themselves thatching, rope making, repairs to houses, and agricultural plant are generally available.

I will calculate the earnings of a village labourer, who is not in very favourable circumstances for saving, that is, one who has only one boy able to work and only one girl, but I will suppose they enjoy fair health.

	Seers.	Rs. a. p.
The husband; 60 seers $\times$ 12 months - - - - -	720	
perquisites - - - - -	38	
cash - - - - -	"	2 0 0
The wife; weeding, harvesting, &c., $3\frac{1}{2}$ months - - - - -	"	10 8 0
spinning, &c. - - - - -	"	8 0 0
A boy of 12 years; 38 seers, say, 10 months - - - - -	380	
A girl of 9 years; harvesting and weeding, $3\frac{1}{2}$ months - - - - -	"	5 4 0
Gleaning and grass cutting, &c., of the wife, boy, and girl - - - - -	"	1 0 0
Total earnings - - - - -	1,138	26 12 0
Consumption of grain by family under - - - - -	800	
* Balance at least $8\frac{1}{2}$ maunds - - - - -		20 0 0
Total - - - - -		46 12 0
Expenditure in cash, clothing at Rs. 6 a head - - - - -		24 0 0
Condiments, salt, oil, &c. - - - - -		12 0 0
Savings - - - - -	Rs.	10 12 0

* Valued at present high rates. For the balance they could obtain very nearly retail rates.

This surplus of Rs. 10-12-0 would be much reduced when their surplus grain has to be sold at much lower rates. It is therefore quite clear that the hired labourer paid in grain (so long as work is available), is better off when prices are high than at other times, and while he profits by high prices the man paid in cash must suffer.

villages near jungle tracts wages will probably be lower than I have assumed, but here he is, I think, more than compensated by the mhowa and wild fruits picked up at no appreciable cost by the members of his family. Mhowa will, I think, replace double its weight of grain, on alternate days for four or perhaps five months of the year.

From this margin of Rs. 10-12-0, or less, he can provide something for sickness, or for holidays. He will have in course of time to marry the boy and also the girl. This will cost him about Rs. 12-0-0 on each occasion. With more boys, with fair luck and health, with steadiness and frugality, he ought in the course of six years to be able to raise himself to the position of a cultivator, and any malguzar, whether resident or non-resident, would prefer such a man as a tenant (rather than an embarrassed man born in the grade of cultivators), and the malguzar would be glad to give him a helping hand.

Almost always when a steady village labourer engaged by the year is in want of temporary help, he can obtain an advance of a few rupees from his employer without interest. The amount of indebtedness of the whole class to their employers is in ordinary times quite insignificant, and they clear themselves at harvest time. They are also, I may say, free of debts

to the Banias. I consider then that the hired agricultural labourer is usually able to subsist with fair ease on his earnings. But there is always the fear of a long and incapacitating illness hanging over a family. Even in this respect there has been, I am everywhere assured, a marked improvement of late years; I am told that there are more old people to be seen, and long fevers preventing labourers from earning their living are much less common.

Wardha, Mr. Bapu Rao.—Men only are employed as farm labourers by the year. They get from 40 to 50 seers of jowari a month, and a single cash payment from 1 to 4 rupees. Sometimes a blanket and a pair of shoes also are given.

If it be stipulated that wages are to be paid in cash, he will get from 32 to 35 rupees in the year. Servants are fed on three holidays in the year, or else get a present of 5 seers of jowari and wheat.

At harvest time they get a present from the new grain from 10 to 30 seers of jowari. The servant is shaved at the master's expense.

The barber gets from 12 to 25 seers on each plough, and shaves all the male members, servants, and visitors of the cultivator.

The smith and carpenter get double of what the barber is paid, and does all the work required by the cultivator in respect of his agricultural tools and plant.

The Patwari and Astrologer get their trifles in kind at the harvest.

Q.15. The following rates are paid to hired field labourers:—

Labourer.	Men.	Women.
1. Removal of old stalks of jowari and cotton from dry fields.	Not employed. If any work willingly, the same rate is paid as for woman.	1 anna per diem.
2. Assisting the ploughman in sowing.	Not employed	1 anna per diem.
3. Weeding	Not employed	From 3 pice to 5 pice, i.e., from $\frac{3}{4}$ of an anna to $1\frac{1}{4}$ anna. Same as for men.
4. Picking up cotton at the first and second picking.	Twelfth part of the cotton picked, which is from 2 to 3 seers per diem; and half for the third picking, which gives from 1 to $1\frac{1}{2}$ seer per diem.	Not employed.
5. Cutting jowari plants	5 seers of jowari per diem	Do.
6. Binding sheaves of plants	Do.	Do.
7. Cutting ears of jowari from stalks.	Ears sufficient to yield about 5 seers of jowari per diem.	Ears sufficient to yield about $2\frac{1}{2}$ to 3 seers of jowar per diem.
8. Threshing	5 seers of jowari per diem	Not employed.
9. Reaping wheat	Same as No. 1.	$2\frac{1}{2}$ seers of wheat per diem.
10. Do. linseed	Do.	1 anna per diem.

If any man does not get employed by the year, then he works by the day. Such a man and his wife earn about as follows during the year:—

	Cash.	Grain worth	Total.	Annual Expenditure in living.	Balance.
Men	Rs. 4	Rs. 28	Rs. 32	Rs. 32	—
Women	Rs. 10	Rs. 6	Rs. 16	Rs. 16	—
				48	

This is the average income of a village labourer. But should he and his wife be specially strong and industrious, they get much larger wages, and by frugal living save sufficient in a few years to buy a pair of bullocks to start cultivation. The average income which a labourer gets is generally sufficient for his wants, but he has often to borrow money or grain for his maintenance at times when he finds no employment for a considerable period. Instances are known of labourers being in distress, but generally they get enough to live on.

Wardha, Mr. Laurie.—Hired field labour is of several kinds. Mr. Elliot in his Hoshangabad Settlement Report has given a convenient summary of the services in agriculture which are performed by wages-paid labourers, and I will follow his enumeration as far as it is applicable to this district. Without dissertation of any kind, I put in tabular form the information I have gained from consulting Malguzars of all parts of the district on the rates of wages and the method of payment, so as to reply to queries (1), (2), and (3) of this group.

Labourer.	Wages.	Remarks.
1. Ploughman (regular, i.e., employed all the year round).	60 to 70 seers of jowari <i>per mensem</i> , now worth from Rs. 3 to Rs. 3-8-0.	He also often gets a pair of shoes and a <i>kamal</i> or blanket as perquisites. When not ploughing he is employed in <i>rakhwali</i> and other jobs.
2. Ploughman (occasionally employed by the day for some special work).	$2\frac{1}{2}$ to $3\frac{3}{4}$ seers of jowari a day, now equal to from 2 to 3 annas a day.	
3. Sowing, i.e., feeding the drill.	5 to 6 pices a day	Usually work for women.
4. Weeding— (a.) Men (b.) Women	$1\frac{1}{2}$ to 2 annas a day 3 to 4 pices a day.	The rate varies according to the supply of labour. The payment is made daily for such as are very needy; for those who can afford to wait it is made weekly. The demand for pice at the beginning of the weeding season sometimes causes the coin to sell at a premium of a pice or more in the rupee with the local money-changers.
5. Stubbing (i.e., clearing ground of roots, &c.) <i>In Arvi.</i>	1 rupee for 20 cubits of land stubbed in Arvi. This work is done elsewhere with the plough.	

Labourer.	Wages.	Remarks.
6. Watching - (<i>Rakhwali.</i>)	60 seers a month for two months, or 2 seers a day. When on daily rates $3\frac{3}{4}$ seers a day.	Usually the ploughman is employed.
7. Reaping— (a.) for jowari (b.) for wheat	$3\frac{3}{4}$ to $5\frac{1}{2}$ seers of jowari a day= $2\frac{1}{2}$ to 4 annas a day. One out of every 20 "pendies" or big sheaves of wheat cut, i.e., 5 per cent. of the amount cut by the reaper. A man is generally able to cut 20 pendies in a day.	
(c.) for tilli	Daily labour rate.	
8. Winnowing	$3\frac{3}{4}$ seers a day	Work generally done by the cultivator and his regular servants.
9. Cutting hay	From 10 or 12 annas to 1 rupee the 1,000 pullas.*	$3\frac{3}{4}$ to 5 seers of jowari is thus the average daily wage that is paid in kind. Most hired field labourers are thus paid, weeding alone demanding the use of coin, as the work does not itself bring in anything immediately useful. As the food of a man in full work is only a $1\frac{1}{2}$ seer, there is a possibility of laying by two or three days' food for every day of work. If the harvesting periods (at both seasons) do not extend beyond three months, a man could even thus subsist himself in the slack time. But he has generally children to maintain, and there are other needs to supply, so that he probably gets into debt, if any one is rash enough to lend to him. The fact that weeding is paid <i>weekly</i> shows that the weeders have something on hand to help them going at first.
10. Picking cotton	$\frac{1}{12}$ th or $\frac{1}{10}$ th of the quantity picked; generally amounts to $1\frac{1}{2}$ to 2 annas worth of cotton a day.	
11. Picking gram	1 pendi out of every 20 picked. A man can pick in a day 40 or 50 pendies. The pendi holds $2\frac{1}{2}$ to $3\frac{3}{4}$ seers.	
12. Gathering als	Pendi rate about $3\frac{3}{4}$ seers a day can be thus earned.	
13. Herdsman	60 seers a month if a regular servant; occasionally employed men get 4 pices or 1 anna per head of cattle per mensem in the district; at head-quarters much more.	

* The pulla of Wardha is about equal to three of the ordinary pullas of the Nagpur district.—G. J. N.
† But there is no necessity for his idling during the rest of the year.—G. J. N.

Narsinghpur, Mr. Bhargo Rao.—Permanent servants engaged all the year round are employed in ploughing, sowing, cutting the crops, watching the fields, and doing all the business which a cultivator would do himself if he had no servant.

Servants employed to watch the fields are often employed for six months, or for two or three months at the lowest at a time, as their services may be required.

Additional labourers employed for cutting the harvest are paid at daily or contract rates.

Additional labourers are also employed in ploughing and sowing. These are not employed for longer periods than a month at the most.

For permanent servants the wages in this district are either paid in grain or in money. Ordinarily the wage is equal to Rs. 2 a month; sometimes the rate varies from 2 to 3 rupees, but these rates are for ordinary years. This year they have risen to Rs. 4 per month, as grain now sells at greatly enhanced rates. When wages are paid in kind the usual rate is 16 maunds of wheat and gram in equal proportion for the year.* In addition to this a permanent servant gets a pair of shoes, one blanket, and at the time of sowing and reaping a small quantity of grain; not more than a rupee's worth altogether is given to him.

Watching of the fields is often given on contract; two or three neighbouring cultivators join together and engage a servant on a salary of Rs. 2 to Rs. 3 per month. When payment is made in kind a labourer gets on an average one seer and a half per day. If they are employed for six months the wages are eight maunds of wheat and gram, besides a blanket and a pair of shoes, and a small quantity of grain at the time of harvest.

* This amounts to $3\frac{3}{4}$ th khandies of wheat and gram, and compares favourably with the 4 khandies of jowari earned by the ploughman in the Nagpur district.

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Servants employed in ploughing and sowing get from Rs. 3 to Rs. 4 per month, or at a daily rate of $1\frac{1}{2}$ annas to 2 annas. Persons employed at the time of cutting are paid the daily rate above mentioned, or they are paid according to the quantity of work done, i.e., one bundle for every 20 cut by them. Cutting is also given on contract, and this plan is generally preferred.

The labourers, as I have said above, are paid in cash and also in kind. The payment one way or the other is fixed with the consent of the contracting parties.

The labourer generally gets enough to live on, but he is seldom without a family of children, and his earnings are not enough for the family; but his wife and child, if grown up, assist him, and they earn a part of their living. Men who are not employed all the year round by one master need not be idle for the rest of the year; as soon as the ploughing and sowing operations are over, weeding follows; preparations are made for cutting the autumn harvest; then follows watching and cutting of the rabi crops. When cultivators are at leisure, if they have the means, they employ labourers in embanking their fields. It is only in cases where a labourer has a family and small children that he is obliged to borrow, and in such a case his condition is very hard.

Saugor, Mr. Imrie.—Hired field labourers are paid according as their labour is given in the weeding, the grass-cutting, and the harvest season. Ploughing and sowing are done by the members of the family or by house servants, the latter receiving Rs. 2-8-0 or Rs. 3 a month; or in some cases $2\frac{1}{2}$ seers grain a day.

The ploughing and sowing are soon over after the first burst of the rains. The weeding season extends over four months, but only two months' full labour is expended. At that time the hired labourer is paid in kind, except in some villages near Saugor, or one of the larger towns. There the market price of labour,

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say, 6 pice a day, is given, but all my informants state that even near Saugor it is rare to pay wages for weeding, save in kind. The amount given varies from ($1\frac{1}{2}$ to $1\frac{3}{4}$ seers) $2\frac{1}{2}$ measures of kodo and kutki being held equivalent to $1\frac{1}{2}$ wheat. Apparently $1\frac{1}{2}$ seers is the general rate, except at a distance from Saugor, where $1\frac{1}{2}$ seer is more commonly given.

Then for cutting grass. This is almost everywhere paid for in money at 1 per 4,000 pulas and at 5,000 when the money is advanced, or in distant tracts 5,000 pulas. In one of the villages payment is made in kind at $2\frac{1}{2}$ seers a 1,000. Grass is cut in December and the month before and after.

Then at the wheat harvest payment is rarely made in money. Payment is almost always in kind, by the armful of crop cut. The usual rate is one pur (armful) for the working day, i.e., from 11 o'clock till evening: or 2 purs from morning till evening. The sheaf-binders get double of this, as their labour requires more skill. Ploughs are driven by members of the family or house servants. In a good harvest year almost double is given, and some Malguzars say they sometimes give treble.* From one pur $1\frac{1}{2}$ seers generally is threshed out; but sometimes $3\frac{1}{2}$ seers of grain.

For the cotton picking the rates are those for weeding; and for the jowari and rice harvests as for the rabi.

House servants get a blanket as the rains set in, and one or two pairs of shoes in the year.

The average hired labourer of the average village finds work in the village for almost the whole year, only between the harvests, when, however, he may be guarding the crop; and in the hot season his labour is dispensed with. And taking the number of labourers' houses in a village as generally equal to that of cultivators, I think a labourer with a small family dependent on him is quite able to subsist on his gains in those intervals. In harvest time he obtains as much grain a day as will last him three, and at other times not much less. Of course, if he has a large family solely dependent on his labour, or any unusual expenses, like a marriage, he must incur debt. And I am told by all I have asked on the subject that not 10 per cent. of the labouring population are out of debt, while very few are in debt over 10. This explains itself. The labourer has no landed interests in the village, neither profits to toil for nor security to give.

But though in debt, I do not imagine that, receiving wages as he does in kind, the cultivator ever curtails his allotment; and while there is work for him, and the grain he gets can feed his family and more, the labourer is safe.

The problem is, however, complicated by the fact that at harvest time only half the labourers employed belong to the village, and of the other half perhaps half do not belong to the district. My information allows me to state generally that in March numbers, amounting to one-fourth of the labourers actually employed, come from the surrounding districts, particularly Tehri, where it is said the insecurity of tenures permits of little outlay on the fields. And as many labourers as come from foreign territory do not belong to the village of which the crops are being reaped, though they belong to other parts of the Saugor district, these therefore share in the harvests of at least two villages.

I am of opinion on the whole that in ordinary years the labourer is able to subsist with fair ease on his payments in the harvest and other seasons. As to those who come from other districts, I know nothing; but I am told that they take back enough grain with them for their own wants.

Many labourers are of course compelled to borrow. If 90 per cent. be in debt, then I presume 90 per cent. have to borrow. But this indebtedness is

* I imagine this can only be when the Bundelkhand labourers are fewer than usual, and when the weather appears to be threatening.—G. J. N.

what they cannot help, and is rarely very deep. It is a condition they tend to; it simply means that they have nothing to spend in luxuries, and that does them little harm. Where there is work, there they have subsistence, which enable them to weather the year with fair ease. If they have children to support and many, the evil cures itself as these grow up."

Seoni, Mr. Wasadeo Bullal Kher.—Hired field labourers are of the following descriptions:—

The Barasiya,—employed by the year. He is required to do any work which the employer may point out to him in respect of cultivation. The whole of his time and skill are at the disposal of the employer. The annual wage varies from 6 to 3 khandis or 2 to 1 seer per day.

The Pakhiar,—employed by the fortnight; must work in the same way as the Barasiya, and may be retained or discharged as each fortnight is completed. The wage is 4 kuras for two weeks, or 2 seers per day.

Harwaha,—ploughman, is employed for the whole year. But he will only drive the plough, bring in grass for thatching the house, and will fence and hedge the Bari, &c. He will not do anything else. He* receives $\frac{1}{3}$ th share of the profits in grain crops, $\frac{1}{2}$ nd of gur, half the share of cotton, and this way the individual ploughmen get different shares in different kinds of crop.

Bardia,—Cowherd—grazer of cattle, exclusive of plough bullocks. He takes $\frac{1}{4}$ 4 kuras per cow=28 seers, 8 kuras per buffalo, 56 seers.

Charwaha—grazer of plough bullocks,—takes $1\frac{1}{2}$ khandis per annum. This man must graze the bullocks without taking them at a distance from the fields to be ploughed. He must take charge of the bullocks as they are disengaged from the yoke in rotation, and bring fresh pairs to the yoke. Generally a boy does this work.

The Banihars,—the day labourer, employed occasionally on work which the standing servants or home labourers could not accomplish, as for instance, in cutting the crops, gleaning, weeding, transplanting rice crops, &c. The daily wage is not less than 2 seers, whether for man or woman.

All these labourers receive their wages in kind. The rate does not vary with the market prices of the grain.

The permanent servant adds to his own wages those of his wife and such of the children as can do field work, so that, unless the unproductive members of his family are not too many, or unless he is kept at home by sickness for some time, he ought, and I believe does, subsist with fair ease on his and his wife's earnings. Any disturbance of these conditions tends to drive him to borrow, and the debt may grow faster than he can manage to pay off. Instances are by no means rare of a cultivator's servants being compelled to steal the grain of his employer, because having already spent his advances of grain, the master will not advance any more.

The day labourers generally remain pretty well occupied for about 5 months of the year; $2\frac{1}{2}$ months in cutting and gathering the crops of both seasons; $\frac{1}{2}$ month in cleaning; 2 months in weeding, transplanting, &c.; total, 5 months.

And as the daily wage of these is 2 seers—to the average requirements in food grains of 3 to 4 souls, it may be assumed that the savings of the working season should suffice for the food requirements of one or two souls; the other necessities of life, such as clothing, &c., are easily procurable by the proceeds of other labour which is available during the remaining months of the year. Bringing in fuel, grass and other jungle produce to the market for sale or collect-

* No doubt this must be limited to the produce only of such land as the individual ploughman has been employed, or the $\frac{1}{3}$ th will be divided among all the ploughmen of the same employer.

† This can hardly be the rate in villages, probably only what is paid at the head-quarter of the district.—G. J. N.

ing mhowa for its owner, are the principal kinds of additional work which might be performed during the intervals of field work. In many cases spinning and weaving the roughest country cloth is followed when field labour is slack. On the whole, this last class of hired workmen seem to do well. They often are able to lay by savings, and when they accumulate, can provide the means of starting themselves as independent cultivators. It not unfrequently happens

that a broken ryot, when he sees no chance of raising his head above his debts, or can no longer bear the losses of bad years, looks forward to the life of a day labourer or permanent field servant, in order to secure that relief which his improvident management of the land prevented him from achieving. This would prove that the labourers are more successful in their aims than the general run of cultivators.

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Akola District.—Women are paid from 1 to 2 annas and men from 2 to 4 annas per diem for weeding, &c. The rate varies according to the demand for field labour. Hindustani labourers are often employed by the year or month at wages of about Rs. 2 per mensem, with their food.

Labour in harvest operations is paid for in kind. For the first picking of cotton $\frac{1}{10}$ is given; for the second picking, $\frac{1}{8}$, and for the third picking about $\frac{1}{4}$.

For harvesting joar a basketful of heads of grain.

Ellichpur.—Women from 1 to 2 annas, men from 2 to 4 annas. Plough with three pairs of bullocks and four men, Rs. 2. Harrow with one pair of bullocks and one man, 12 annas at harvest.

From $\frac{1}{10}$ to $\frac{1}{8}$ part of the first picking of cotton. For the second, third, and fourth pickings the rates are increased respectively to $\frac{1}{8}$, $\frac{1}{4}$, $\frac{1}{2}$ of the quantity of cotton picked.

For collecting ears of joar a quantity of ears equal to eight seers of joar. For collecting ears of wheat half the quantity of seed sown in the whole field on contract, or five bundles per 100 bundles harvested.

Amraoti, Lieut.-Col. Menzies.—Hired field labourers are paid from 1 to 3 annas per diem; the payment is very frequently made in kind. Weeding costs an anna, harrowing 2 annas, ploughing $2\frac{1}{2}$ annas to 3 annas per diem per man employed. Hire of plough bullocks amounts to from 8 to 12 annas per diem.

Wun, Major Szczepanski.—Field labourers are of two classes:—1st. Those employed as servants for looking after the cultivation of the land, and other ordinary field work, and who are generally engaged by the year, and are paid partly in cash and partly in grain, the ordinary wages being Rs. 20 per annum and 24 maunds (864 seers) of grain.

2nd. Those engaged by the day during crop and harvest season for weeding fields and such like work. Both men and women are employed at these times. The wages vary according to the season. Thus at sowing time a man gets 5 annas and a woman 2 annas a day. At weeding season a man gets 3 annas and a woman $1\frac{1}{2}$ annas a day. At present the payment is made in grain. A man getting 9 seers a day is equal to about 8 annas to the man and 4 annas to the woman.

The hired labourer would generally forestall future payments if it were in his power to do so, but having no security to offer, his credit is very limited, and this prevents his running much into debt.

The payments he receives for field work are not sufficient to keep himself and family throughout the whole year, but during the intervals of non-employment he can generally find some other work.

Amraoti, Lieut.-Col. Menzies.—The hired labourer has rather a rough time of it on his small wages, but many of them are men from the North-West and Oudh, and these men positively save. Wages are constantly forestalled, and the labourer at the end of the season finds himself in debt to his employer, and has to bind himself to serve for some time on nominal wages, plus his food, to pay off his debt.

Ellichpur, Major Mackenzie.—The hired labourer is not usually able to subsist on the grain or other payments he receives. He does not, however, borrow or forestall future payments, but seeks other employment, or subsists by fuel or grass, which he brings from the forest for sale.

Wun, Major Szczepanski.—The hired labourer is obliged to borrow, as it is rare for him to save anything out of his daily wages.

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Lieut.-Col.
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Kaira.—Hired field labourers get 2 annas a day, besides bread $\frac{1}{2}$ lb. and dhal $\frac{1}{2}$ lb. In the busy season ploughmen get 4 annas, and weavers—men 3 annas, women 2 annas, children $1\frac{1}{2}$ annas, all with one meal a day.*

Wages of labour are—	Per Day.
Blacksmith	8 annas.
Carpenter	8 "
Sawyer	8 "
Mochi	8 "
Bricklayer	6 "
Tailor	5 "
Weaver	5 "
Mill hands—	
Men	4 "
Women	2 "

The hired field labourer always has to live from hand to mouth in the hot season between employments. He borrows all he can get and forestalls all he can.

* See for general table, Administration Report of Bombay, Appendix B. (10), Prices of Labour.

Surat.—Field labourers get (in coin), men 3 annas, women $2\frac{1}{2}$ annas. They have no credit to borrow.

Thana.—Field labourers get from 2 to 4 annas a day, or from $2\frac{1}{2}$ to $4\frac{1}{2}$ lbs. of grain. These wages do not suffice to feed the labourer in the slack season; he then borrows.

Colaba.—Field labourers get from 2 to 3 annas in corn. They subsist in the slack time by cutting fire-wood and odd work.

Khandesh.—Permanent labourers are paid Rs. 40 or 60 a year, with two pairs of shoes and one blanket. They are paid monthly or quarterly, and usually in advance. Temporary hands get, men $2\frac{1}{2}$ to 3 annas a day, women 1 to $1\frac{1}{2}$ annas. Harvest work is paid partly in money and partly in grain, as a rule daily. The labourer is able to subsist in the slack time on what he makes in the busy season.

Poona.—Wages vary. Field labourers sometimes get 2 annas a day and their food. Mhars when threshing get 3 lbs. of grain. Permanent labourers get their food and Rs. 10 to 20 at the Dewali. The wage suffices for a labourer's wants.

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Kaladgi.—Field labourers are generally paid in kind, 3 Bengal seers per man, 1½ per woman, 1 per boy or girl above 7. For sowing, which is in some sense skilled labour, 4 seers are given. Similarly for reaping 5 or 6 seers, and women 2½ to 3. For harvesting 4 seers and 2. If cash is given, it is the value of the grain at current rates. Cotton picking is paid in kind. In ordinary years the wages earned in busy times carry the labourer over the slack season, and he is fairly well off. The women also make something by spinning.

Canara.—Field labourers get from 3 to 6 annas per diem, generally in kind. A carpenter earns from 6 annas to 1 rupee, blacksmith 8 annas to 1 rupee. The labourers generally borrow in anticipation of the grain they receive at harvest time.

Ratnagiri.—Field labourers are paid, males from 2 to 2½ annas per diem, females about 2 annas. They are paid mostly in kind on the Sylhadri slopes, and partly in cash, partly in kind, towards the coast.

As one approaches the coast the rate of wage increases up to 3 annas for males.

Road labourers are paid not less than 3 annas.

Selected road labourers receive from 3 to 4½ annas. Skilled labour, carpenters, blacksmiths, and the like, from 8 to 12 annas.

At the end of May and beginning of June many of the absentees return, and then, notwithstanding the little hoards they may have accumulated, every labouring family on the slopes of the Sylhadri is terribly pinched, and lives partly on roots (such as the root of the wild plantain) mixed with coarse grain until the "halfway" or early warkas crop is ready.

Throughout the zilla the ryot habitually forestalls his coming harvest by borrowing grain from the khote or grain dealer on the "sawai" system, that is to say, an additional payment of one-fourth the grain borrowed, to be paid back at the next harvest.

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In the accompanying statement the rates of wages usually paid in each district for the chief kinds of labour are shown in a tabular form.

Agricultural labourers are as a rule paid in kind, the rates varying in different districts and with the nature of the employment. During the harvest season, when all available hands are employed, the wages are somewhat higher than at other times. A large proportion of the agricultural labourers are permanently in the service of ryots or Mirassidars, and the wages they receive do not represent their entire emoluments. They often receive food in addition to their wages during the cultivation season; house-sites are given rent free; petty perquisites of various kinds are enjoyed; customary presents of cloths, money, &c., are given annually, and on the occasion of important family events advances of money and loans are given, without interest in some cases; and they are allowed the right of gleaning the grain left in the fields and on the threshing floor. It is therefore difficult to estimate precisely the money value of their emoluments, but it may be generally said that their condition is better than the rates of wages given in the statement would indicate, although it must at the same time be admitted that to a great extent they live from hand to mouth, and that they have no means, even by practising the most rigid economy, of accumulating any considerable savings which would enable them to tide over adverse seasons.

In the Wynad coffee plantations money wages are paid to agricultural labourers, but even there a portion of the wages is given in food grain.

The village artizans, such as the carpenter, the blacksmith, the bricklayer, &c., have in many villages maniams, or rent-free lands, or grain allowances, especially the two former, and they are bound to repair the agricultural implements of the ryots free of charge. When they do any other work they receive money wages.

The majority of the collectors who have reported on this question are of opinion that the agricultural labourer is able to subsist with fair ease in all ordinary seasons on the wages he receives for agricultural la-

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bour, supplemented by earnings on public works, &c. during the non-cultivation season, and that they are not forced to borrow or forestall future payments for subsistence, although they do so frequently, for marriages and other ceremonies. The collector of Kistna, however, expresses a decided opinion to the contrary. He states: "The permanently hired field labourer, termed 'paleru,' is nearly always heavily indebted for advances to his master. He is tied hand and foot, and his condition is little better than that of a slave. The daily labourer lives from hand to mouth, and cannot, if he would, forestall future payment."

The difference of opinion arises doubtless in great part from the matter being looked at from different points of view. Judged by the standard of mere subsistence, the condition of an agricultural labourer may be said to be one of fair ease in ordinary times, but that it is extremely precarious must be admitted, as adverse seasons are unfortunately by no means uncommon. The wages he receives in an ordinary season are sufficient for his subsistence, and he is not under the necessity of borrowing, unless he desires to meet extraordinary expenses, as for a marriage or other ceremony. High prices do not necessarily affect his condition to any serious extent, as he receives his wages in grain, and is thus ensured sufficient food for mere subsistence, which is all that he has been educated to care for. When, however, prices are high, as a result of failure of crop, and the employer himself becomes embarrassed, the position even of the permanent agricultural servant becomes critical. Having been unable to save anything to stand him in stead in time of need, and there being no demand for service elsewhere, he is thrown entirely on private or public charity for the means of livelihood. The above description applies, however, to the lowest class of landless labourers only, and not to persons who themselves own land and supplement the income from it by working for hire for others; nor to those who own cattle and cultivate the lands of ryots on the "warum," or sharing system, in whose condition there has been of late years a considerable visible improvement.

STATEMENT showing the RATES of WAGES paid to Agricultural Labourers and Village Artisans in the Districts of the Madras Presidency.

Districts.	AGRICULTURAL LABOURERS.				Smiths.		Carpenters.		Masons.		Remarks.
	Payment in Kind.		Payment in Money.		Maxi- mum.	Mini- mum.	Maxi- mum.	Mini- mum.	Maxi- mum.	Mini- mum.	
	Maxi- mum.	Mini- mum.	Maxi- mum.	Mini- mum.							
	Seers of 80 Tolahs.	Seers of 80 Tolahs.	AS.	AS.	AS.	AS.	AS.	AS.	AS.	AS.	
Ganiam	—	—	—	—	—	—	—	—	—	—	Not reported by collector.
Vizagapatam	{ Villages 2½	{ 2½	{ 2	{ 1	{ 6	{ 2	{ 6	{ 2	{ 6	{ 2	
	{ Towns —	{ —	{ 2	{ 1	{ 6	{ 2	{ 6	{ 2	{ 6	{ 2	
Godavari	{ Villages 4½	{ 4½	{ 3	{ 2½	{ 4	{ 4	{ 1	{ 4	{ 6	{ 6	
	{ Towns —	{ —	{ 2½	{ 2½	{ 6	{ 6	{ 6	{ 6	{ 6	{ 6	
Kistna	{ Villages 4½	{ 4½	{ 2½	{ 2½	{ 7	{ 7	{ 6	{ 6	{ 4	{ 4	
	{ Towns —	{ —	{ 2½	{ 2½	{ 8	{ 8	{ 6	{ 6	{ 6	{ 6	
Nellore	{ Villages —	{ —	{ 1	{ 1	{ 12	{ 5	{ 3	{ 3	{ 12	{ 12	
	{ Towns —	{ —	{ 1½	{ 1½	{ 8	{ 8	{ 5	{ 5	{ 8	{ 8	
Cuddapah	{ Villages 2½	{ 2½	{ 1½	{ 1½	{ 6	{ 6	{ 6	{ 6	{ 4	{ 4	
	{ Towns —	{ —	{ 1½	{ 1½	{ 8	{ 8	{ 8	{ 8	{ 6	{ 6	
Bellary	{ Villages 3½	{ 1½	{ —	{ 1½	{ 8	{ 6	{ 8	{ 6	{ 4	{ 4	
	{ Towns —	{ —	{ —	{ —	{ 12	{ 8	{ 12	{ 8	{ 4	{ 4	
Kurnool	{ —	{ —	{ 2½	{ 2	{ 7	{ 5½	{ 7	{ 5½	{ 7	{ 5½	
Chingleput	{ Villages 4½	{ 2	{ 4	{ 2	{ 12	{ 6	{ 12	{ 6	{ 12	{ 6	
	{ Towns —	{ —	{ —	{ —	{ 12	{ 6	{ 12	{ 6	{ 12	{ 6	
North Arcot	{ Villages 1½	{ 1½	{ ½	{ ½	{ 4	{ 4	{ 4	{ 4	{ 4	{ 4	
	{ Towns —	{ —	{ —	{ —	{ 8	{ 5	{ 8	{ 5	{ 8	{ 5	
South Arcot	{ —	{ —	{ 3	{ 2½	{ 6	{ 6	{ 6	{ 6	{ 6	{ 6	
Tanjore	{ Villages 2½	{ ¾	{ 3¾	{ 1½	{ 6	{ 6	{ 6	{ 6	{ 6	{ 6	
	{ Towns —	{ —	{ —	{ —	{ 12	{ 8	{ 12	{ 8	{ 8	{ 6	
Trichinopoly	{ Villages 2½	{ 2½	{ 3	{ 3	{ 6	{ 6	{ 6	{ 6	{ 7	{ 6	
	{ Towns —	{ —	{ —	{ —	{ 8	{ 8	{ 8	{ 8	{ 8	{ 8	
Madura	{ Villages —	{ —	{ 4	{ 2½	{ 6	{ 4	{ 6	{ 4	{ 12	{ 6	
	{ Towns —	{ —	{ —	{ —	{ 12	{ 6	{ 8	{ 6	{ 12	{ 6	
Tinnevely	{ Villages —	{ —	{ 4	{ 2	{ 6	{ 3	{ 6	{ 4	{ —	{ —	
	{ Towns —	{ —	{ 6	{ 2	{ 8	{ 4	{ 9	{ 4½	{ —	{ —	
Coimbatore	{ Villages 2½	{ ¾	{ 4	{ 1	{ 6	{ 4	{ 8	{ 4	{ 8	{ 4	
	{ Towns —	{ —	{ —	{ —	{ 8	{ 6	{ 12	{ 8	{ 12	{ 8	
Nilgiri	{ —	{ —	{ —	{ —	{ 16	{ 16	{ 14	{ 14	{ 14	{ 14	
Salem	{ Villages 9	{ 1½	{ 8	{ ¾	{ —	{ —	{ —	{ —	{ —	{ —	
	{ Towns —	{ —	{ 12	{ ¾	{ —	{ —	{ —	{ —	{ —	{ —	
South Canara	{ Villages 1½	{ 1½	{ 2½	{ 2½	{ 6	{ 6	{ 6	{ 6	{ 6	{ 6	
	{ Towns —	{ —	{ 2½	{ 2½	{ 8	{ 8	{ 8	{ 8	{ 8	{ 8	
Malabar	{ —	{ —	{ 2½	{ 1½	{ 7	{ 4	{ 10	{ 6	{ 7	{ 4	
Madras	{ —	{ —	{ 3	{ 2½	{ 8	{ 6	{ 8	{ 6	{ 6	{ 4	

MYSORE.

The wages paid in the Kolar district to *jitaqars* or farm servants permanently employed are partly in money and partly in raw food grain or cooked food, and they vary from Rs. 3 to 7 in cash and from 3½ kandies or 1,120 lbs. to 4½ kandies or 1,440 lbs. of food grain per annum or two meals a day if cooked food is given. The chief duties of these servants are to cultivate lands, watch and stack the crop, and attend to cattle. The labourers employed temporarily for weeding, transplanting, reaping, &c., get daily wages as given below:—

	If in Grain.		If in Cash.	
	From.	To.	From.	To.
	Lbs.	Lbs.	As.	P.
Males	4	8	1	6
Females and children	4	6	1	0

The earnings of these labourers, when employed on fields are not sufficient for their subsistence at other periods, but they get ample employment during those periods on tanks and roads which must necessarily be maintained for them to be used.

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Wages of labour are invariably paid in kind, except in or near large towns. In this latter case Lieutenant-Colonel Bannerman thinks the cash wage is about Rs. 3 per mensem.

In *Bhopal* wages ordinarily are 2 seers of grain a day, except in harvest, when one-twentieth of the produce is given to the reapers and the right of gleaning.

In *Baghelkhand* field labourers get 2½ seers of "kodu" per diem, or when kodu is not available,

1½ seers of better grain; but ploughmen get 25 per cent. more than ordinary labourers.

In *W. Malwa* ordinary wages are 2 seers of joar, per diem, or, if in money, 1½ to 1¾ annas. For reaping 4 to 5 seers of the crop are given, or 1½ to 2 annas in money.

For *Manpur*, Pundit Suroop Narain writes:—

"Of field labourers those that are employed in ploughing get 2 to 2½ annas daily. Those employed in weeding get 1½ to 2 annas, the payment in both cases being in cash. The watchman of a field receives

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HYDERABAD.

Moulvie Mahdi Ali.

Wages vary in different districts. In the Maratha country field labourers employed throughout the year are paid from about Rs. 2-8 to Rs. 4 per month, without food being supplied to them. When food is given they are paid at the rate of about Rs. 18 per year, and they get besides annually a country blanket and a pair of shoes. A field labourer employed at harvest time generally gets from 5 to 7 per cent. of the sheaves he is able to cut and gather in a day; this may come to about 2½ seers of grain, besides the straw. If money payments are made, a labourer gets two annas, a woman one anna, and a boy one anna per diem. Money payments are generally made when labourers are employed in weeding, &c. In Bidar and Gulbarga money payments are rare; the labourers receiving grain equivalent to the value of their wages. In the Aurangabad district (*vide* Notes on the Agriculture, by Mr. Furdoonjee Jamsetjee), when the labourer is employed by the year, he generally receives from Rs. 12 to Rs. 30 per annum with food, or from Rs. 45 to Rs. 55 without food. In the former case he is also supplied with the following five articles of dress every year:—

	Rs.
1 Kamblī (blanket), value about	- 1 8
1 Dhoti	- 1 0
1 Pair shoes	- 1 0
1 Turban	- 1 0
1 Waist-cloth	- 0 8
Total	- 5 0

A written agreement is generally entered into by which the labourer binds himself not to leave the service until the expiry of the term of his contract. It may be mentioned here that the labourer has generally to serve 13 months, though he is only paid for a year. The agreement is generally entered into during the months of *Chaitra* and *Vaisak*, when a part of the yearly wages is paid in advance, and the labourer draws the balance in small sums, as he may require, from time to time.

When food is given it consists of four cakes (about 2 lbs.) per day and some vegetables, or *dal*, with *chatni* or onions.

When a labourer is employed by the month a written agreement is seldom entered into, but the labourer engages to give a month's notice before leaving the service. Labourers of this class are seldom employed all the year round, but are only taken on during busy seasons. They do not generally receive food, but are paid a monthly salary, varying from Rs. 4 to Rs. 6, and have to find their own food and clothes. When the labourer receives an advance, he repays it by monthly stoppages out of his salary.

HYDERABAD.

of work, 2 annas daily. The labourers so employed have the additional privilege of getting all the juice which may happen to run off and deposit itself on the leaves or stems of the plant. All field labourers employed by the day are at liberty to work for additional gains when off their work in the field. It is by these additional earnings that field labourers manage to make both ends of their accounts meet, and in some cases they are obliged to have recourse to borrowing or forestalling their future earnings."

When working in the fields his meals are brought to him by one of the women of his family.

Excepting when employed in harvest work, the labourer, when engaged by the day, is generally paid in cash. He receives from two to three annas per diem, and in very busy seasons, when labour is scarce, he sometimes receives as much as four annas (6d.). A woman obtains from one to one and a half anna, and sometimes two annas per day. A boy has about an anna a day. Labourers engaged on daily wages are generally employed on the following work:—

Weeding.—Cash payments are generally made for this kind of work.

Harvesting.—The labourer receives five sheaves for every 100 of the crop he gathers. If it be a jowari or bajri crop, a woman is able to reap from 50 to 75 sheaves per day, and a man 100. Gram, *tur*, &c. is tied in large bundles, called *hadaps*, which vary in size, and of these also the labourer receives five per cent. When scarcity prevails and prices of grain are high, the labourers are not paid in grain, but in coin.

Cotton and ground-nut picking.—The labourer receives about 1/4, 1/5, or 1/8 of the quantity picked in a day. During the first picking the share paid to the labourer is not so large as during the second and third pickings.

Threshing.—For separating the heads of 100 sheaves of bajri and jowari from the stalks, the labourer receives two seers of the heads of corn.

Ginning Cotton.—This labour is generally paid for in cash by marwadis, who purchase the crop, at so much for every seer of cotton ginned. The cultivator, however, gives the labourer the cotton seed in payment of the labour for ginning.

In the Telengana country labourers employed throughout the year are paid at the rate of Rs. 3 per mensem. At the *tabi* harvest each labourer gets besides a rupee worth of grain, and two rupees' worth at the *abi* harvest. Labourers who are employed throughout the year, and who are paid in kind, receive one seer of grain per diem, and at the time of the *abi* harvest they receive four maunds of grain, and at the *tabi* three maunds. Labourers employed temporarily for weeding, &c. receive three seers each of paddy per day, or one seer and a half of rice or jowari. If they are paid in coin, a man or woman receives two annas per diem, but money payments are rare. In some talukas of the Telengana country a maund and a half of grain per month is allowed to labourers employed throughout the year, and at the time of harvest they receive besides three maunds of grain and Rs. 3 in cash.

AVERAGE PRICE OF FOOD GRAINS.

CHAPTER I.—QUESTION 16.

CHAP. I. QN. 16.

What is the normal rate of prices of each of the chief staples of food in certain typical districts? What is the usual variation between the prices at harvest time and other times of the year? What rise in price would indicate the approach of alarming scarcity? In past times of severe scarcity what effect has been produced on prices; has the rise been sudden or gradual, and has it affected one staple more than another? Or has the rise been of such a character as to tend to equalise the prices of all staples

PUNJAB.

PUNJAB.

Major Wace.

Prices of Food.—I take as the chief staples of food—wheat, barley, *bajra*, and *joar*. Of the total average area of annual cultivation, 211 lakhs of acres,

Wheat occupies	- 63½ lakhs.
Barley	- 17 "
Joar	- 22½ "
Bajra	- 29 "

which together aggregate 63 per cent., or nearly two-thirds of the whole. And if the estimate of the food consumed in each district be compared with the statement of crops annually cultivated (both of which papers are appended to the reply to Question 3 of Chapter I.) it will be seen that there are good grounds for stating that these four cereals contribute three-fourths of the food of the population.

There is a material difficulty in stating the normal price of these staples. The truth is that there is nothing of which the value is so unsettled. To illustrate this I append two diagrams showing the prices of these and other principal articles of agricultural produce from the year 1841 to date. The prices shown therein were obtained by striking an average on the prices which annually prevailed in each district. The diagrams will show conclusively that, in the sense of prices which have usually obtained with a fair amount of steadiness over a series of years, no normal prices can be stated. To understand the existing state of prices it is necessary to consider the history of the country for the past 40 years. Up to the year 1847 the country had no roads, and little or no external trade; such trade as existed was burdened with customs and transit dues at every town, and cultivation was in a most depressed state. From the year 1849 all these conditions began to alter; roads were rapidly made throughout the country; trade was freed of all duties; the charges on the land were greatly reduced; and cultivation extended rapidly. The first result of these changes was greatly to cheapen the price of food grains. They were not acting alone, but in combination with a great number of other political and economical changes brought in with British annexation. To explain this I take the following extract from the Punjab Administration Report for the three years ending 1855-56 (para. 45.):—

"The sudden pacification of the Province after annexation, the cessation of military and political employment, which occupied many thousand of persons, and caused money to circulate in the villages induced large numbers to devote themselves to agriculture. Formerly a proportion of the agricultural classes were engaged in war or service of various kinds, and thus they supported themselves and contributed to the support of those who tilled the ground at home. But now the entire support of all these classes fell upon the land. Again, there came a cycle of seasons more favourable than the average of years under British rule. From all these causes the agriculture became unusually productive, flooded the markets with produce, and reduced prices nearly 50 per cent. This cheapness rendered it difficult for the agriculturists to obtain cash for their produce, when it was offered to pay their new money assessments. There was less money in the Punjab than previously; which would formerly have circulated in

the Punjab were remitted to other parts of the Empire by the soldiery and other Government employes. Again, the fact that nothing but cash was accepted in payment of the Government revenue, enhanced the value of money. The agriculturist, therefore, with abundance of surplus produce on his hands found difficulty in converting it into money, and this difficulty was perhaps aggravated by the unvarying nature of the Government demand (however low) with men accustomed to an annually fluctuating demand under Sikh rule."

Looking back on those years, we may perhaps not incorrectly summarise the facts of the time by saying that agriculture expanded with leaps and bounds, whereas there was no corresponding increase in other industries and in trade. And even if we could by any means have avoided levying our revenue in cash (which we certainly could not have avoided), the result on the price of agricultural produce might have been the same.

The report from which the above extract is quoted states that for 10 years preceding 1850 the price of wheat averaged 20 sers the rupee; the diagrams appended to this reply indicate a cheaper rate, perhaps 27 sers. But in 1851, owing to the causes above sketched, wheat had fallen to 42 sers; and from that time to 1859, 40 sers per rupee remained the usual value of wheat. After the famine of 1860-61, wheat in the year 1863 averaged 31 sers per rupee, joar 42 sers and barley 49 sers. But prices thenceforward rose steadily. Of this the explanation, I believe, is, that during the famine of 1860-61 the grain stocks of the Punjab, previously very full, were reduced very low by exportation towards Delhi and the Provinces to the east. The subsequent seasons were not very good; and there was a steady export toward Sind, owing to bad seasons there. The culminating point was reached in the famine of 1868-69; and prices falling immediately afterwards, continued to do so steadily, till again raised by the panic consequent on the failure of the autumn rains of 1877. They have since fallen, but as yet not to the level obtaining before the panic set in.

In the interval between the cessation of the famine of 1860-61, and the commencement of that of 1868-69, wheat after falling in 1863 to an average price of 31 sers, rose steadily; till in 1867, the year before the next famine, it averaged 22 sers. Similarly the average price of barley was 49 sers in 1863, and rose steadily to an average of 31 sers in 1867, joar in the same period rose steadily from 42 to 29 sers the rupee.

In order to examine more exactly the course of prices since the effects of the famine of 1868-69 passed off, I have compiled a statement, which will be found in the papers appended, showing for 10 districts in different parts of the Province the prices which have prevailed from April 1873 to date. These years up to the autumn of 1877 were prosperous years; and include at their commencement both the drain caused by the Bengal famine of 1873-74, and at their close that caused by the usual export trade of wheat to Europe and by the famine of 1876-77 in Southern India.

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Taking the four years commencing April 1873 and ending March 1877, the return indicates the following as the normal price of the principal food grains for those years :—

	Delhi.	Mooltan.	Amritsar.	Dera Ismail Khan.
Wheat - -	23	19	25	28
Barley - -	31	27	35	42
Bajra - -	25	24	26	40
Joar - -	27	25	32	43

The Mooltan prices are highest owing to the proximity of that city to Sind, and to the river export trade with that Province. The prices at Delhi, on the border of the N.-W. Provinces, though lower than those of Mooltan, are higher than those prevailing at Amritsar in the centre of the Punjab. Dera Ismail Khan is an instance of a retired rural district in the west of the Province; its distance from the Sind markets exceeds that of Mooltan by barely 153 miles, and this seems scarcely adequate to maintain permanently so great a difference in prices, as the above table exhibits.

It is extremely difficult to say whether the prices of the next five years will approximate to those of the years 1873-76.

The Bengal famine of 1873-74, the famine in Southern India of 1877, and the rising export trade of wheat from the Presidency Ports to Europe, have all drawn largely on the food grains of the Province. The railway connexion of the Province is complete with Calcutta and Bombay, and now finally with Karachi. The cost of conveying a maund of wheat by rail to Calcutta is about Rs. 1 8 0, and to Bombay Rs. 1 12 0. The distance from Amritsar to Karachi may be roughly stated at half that from Amritsar to Calcutta. Wheat is cheap in Bombay at 12 sers, and in Karachi at 14 sers. These are items of trade which will be in the future very closely watched by the traders of Upper India. But unless we assume as probable a very rapid growth of the wheat trade with Europe there would appear to be no very strong reason why the prices of the years 1873 to 1876 should not shortly repeat themselves.

The prices of this period correspond fairly with those indicated in the diagram appended for the period 1863 to 1867, which I have above stated, and it seems highly improbable that we shall ever return to the cheap prices which prevailed in the 10 years ending 1859; when we had no railway system, no practicable trade connexion with Eastern and Southern India, and no export of grain to Europe.

The prices of barley, bajra, and joar (though usually for barley 8 or 10 sers and for bajra and joar 5 sers cheaper than wheat) will always vary with the price of wheat. The diet of the people is not confined to one description of grain; therefore a rise in the price of one is certain to create a proportionately increased demand for the others, and so it is not possible that an excessive demand for, or failure in supply of, one grain should arise without the price of all the principal food grains being similarly affected.

I hope I have shown good grounds for my statement that there is nothing so little settled in the Punjab as the price of food grains. It has been continually changing for the past 30 years. And it is only now after the completion of railway connexion with the rest of India that we can hope to be approaching more

settled prices. But this again depends on the future of India's export trade. All that is really certain is, that such extreme depressions of the value of food grains as took place after annexation are improbable in the future.

The return of prices appended does not bear out the apparent assumption that prices at harvest time will usually be cheaper than at sowing time. Other things being equal, undoubtedly prices rise at sowing time and fall at harvest time, and the farther a district is removed from the main centres and channels of trade in the Province the more these seasons will affect prices. But the state of trade and the character of the harvest are much more powerful influences. If a poor harvest succeeds a year of plenty, or if a sudden drain by export arises between sowing time and harvest, the harvest prices will be as dear or often dearer than those of the sowing season; and conversely if the harvest is plentiful, and the export demand small, the harvest prices will be lower. If the return of prices appended be examined, it will be seen that it is by no means the rule that prices are cheaper at harvest time than at sowing time.

If the Punjab during the past 20 years had been free of the disturbing influences of scarcity and of new developments of export trade, it would have been possible to frame an answer to this question. But on a full consideration of the history of prices during this period as described above, I see no way of framing a reply, which would not be merely a questionable generalization. There is no district which can be said to be outside the influences of external trade.

The reply to Question 2 contains all the data needed to meet the inquiry as to the relation between prices and the approach of alarming scarcity. When scarcity is threatened, all prices rise equally in value for the reason stated a few lines above. The rises which precede periods of scarcity are usually sudden, being commonly caused by the failure of the autumn rains; a failure which in the present state of the people's knowledge it is not possible for them to foresee. In the nature of the case the rise in prices will take effect during the two months following the kharif sowing time, and will become aggravated when it is clear that not only the kharif harvest but also the rabi sowing have been lost. I am not able to quote the monthly prices of the years 1860-61 and 1868-69, but in the following table I give the extent of rise which took place in the two months of August and September 1877 :—

	Prices at Delhi.		Prices at Amritsar.	
	End of July.	End of Sept.	End of July.	End of Sept.
Wheat - -	21	12	27	14
Barley - -	33	17	46	18
Joar - -	24	15	32	19
Bajra - -	21	13	25	16

When wheat rises suddenly in this way to 12 or 14 sers the rupee, and the other staples rise in price at the same time, and in the same degree, it is certain that severe scarcity is impending. Such scarcity may not follow; for instance, it did not last year; but everything depended on the rabi sowings, and at the last moment timely rain secured them. If those rains had not fallen, we should certainly have seen wheat selling by December at from 8 to 10 sers the rupee over the greater part of the Province.

Appendix 3.

DIAGRAM SHOWING THE RISE AND FALL IN PRICES OF PRINCIPAL ARTICLES OF AGRICULTURAL PRODUCE IN THE PUNJAB, FROM 1841 TO 1856.

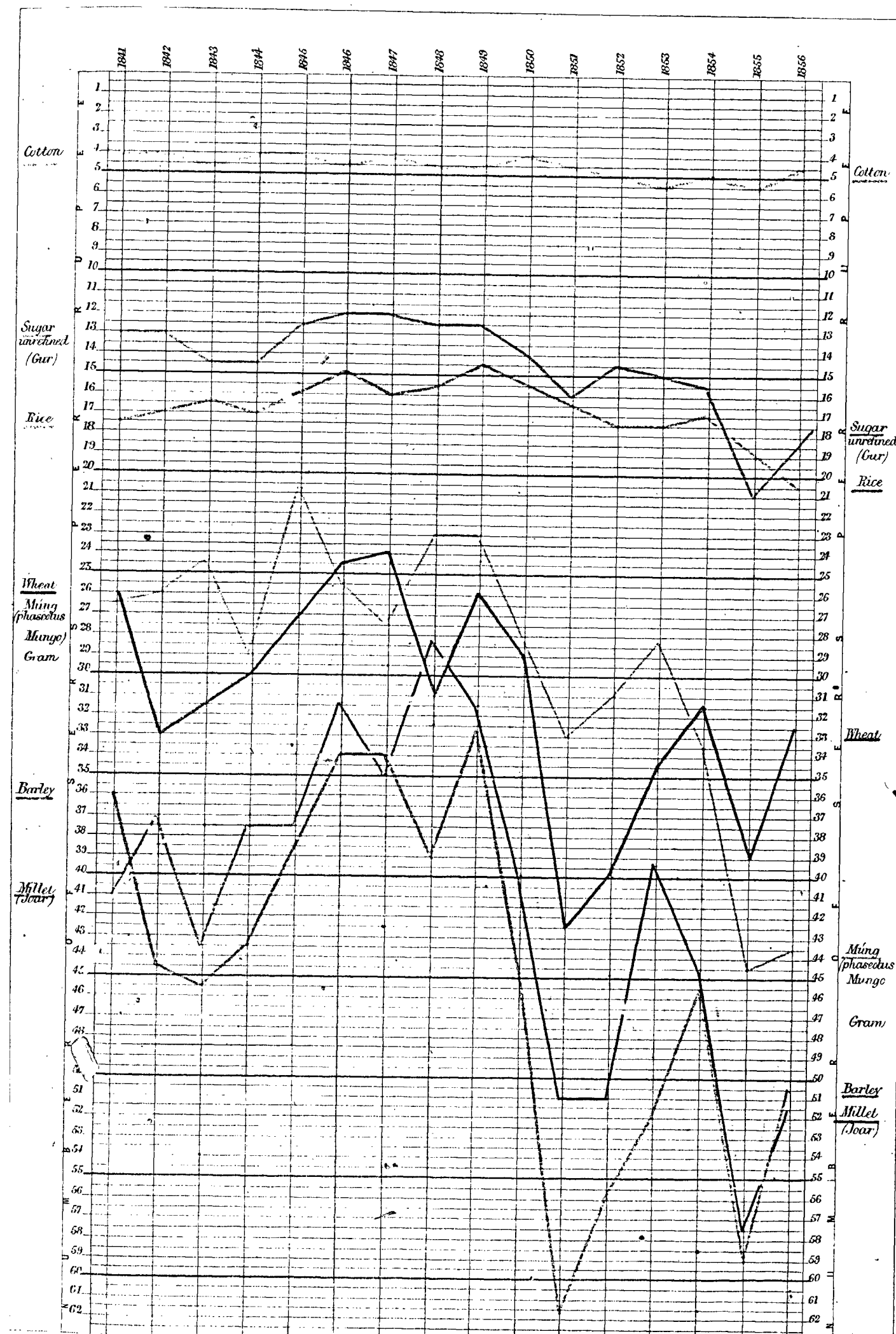
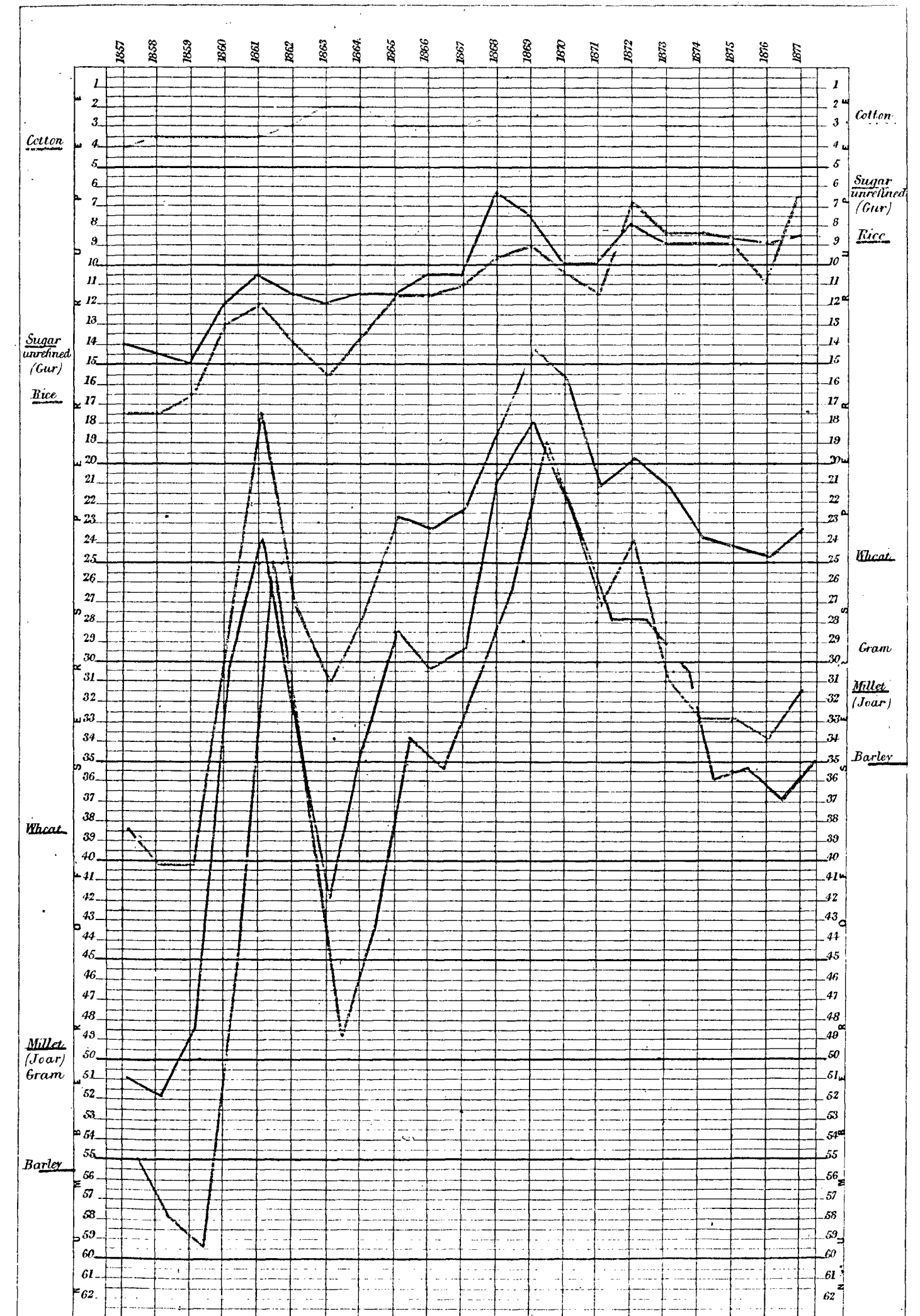


DIAGRAM SHOWING THE RISE AND FALL IN PRICES OF PRINCIPAL ARTICLES OF AGRICULTURAL
PRODUCE IN THE PUNJAB, FROM 1857 TO 1877.



STATEMENT SHOWING MONTHLY VARIATIONS in the RETAIL PRICES of Food in selected Districts of the PUNJAB from April 1873 to September 1878.

[illegible]

[illegible]

AVERAGE PRICES OF SUGAR FROM 1888 TO 1893																							
Meerut	-	13	0	22	1	28	7	20	7	24	11	20	7	25	1	29	5	19	3	13	9	21	9
Agra	-	13	3	21	15	23	11	16	13	28	5	17	9	25	9	29	15	18	7	13	1	19	13
Cawnpore	-	13	15	23	5	25	3	21	6	20	6	22	3	28	4	35	1	19	1	13	4	22	3
Bareilly	-	12	4	23	5	27	8	18	6	19	9	17	0	23	15	31	0	16	4	13	0	20	3
Lucknow	-	13	1	21	1	21	4	17	9	16	9	18	15	26	15	38	3	18	5	13	11	20	9
Fyzabad	-	14	8	17	0	23	9	17	2	18	6	16	1	21	0	28	7	21	0	13	13	19	2
Allahabad	-	12	8	19	4	18	9	16	15	17	9	19	14	27	3	33	3	21	12	13	5	20	0
Gorakhpur	-	17	8	16	10	31	4	no returns.		16	13	17	0	19	1	34	3	27	8	12	6	21	7
Benares	-	13	1	19	5	20	8	17	12	16	14	16	4	25	3	27	11	19	11	11	11	18	13
Jhansi	-	12	3	24	13	27	11	20	12	16	9	18	8	22	1	32	11	21	0	19	8	21	9

CHAP. I. QN. 1
NORTH-
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District.	Average of 1869.	Average of 1870.	Average of 1871.	Average of 1872.	Average of 1873.	Average of 1874.	Average of 1875.	Average of 1876.	Average of 1877.	Average of 1878.	Average of 10 years.	Remarks.
AVERAGE PRICES OF COMMON RICE FROM 1869 TO 1878.												
Meerut -	9 4	13 4	16 8	14 5	12 4	13 1	15 9	17 15	12 3	9 0	13 6	
Agra -	10 8	12 3	13 8	13 0	13 9	10 5	12 1	14 0	11 4	8 0	11 13	
Cawnpore -	11 3	14 3	17 1	14 8	14 5	13 11	16 12	18 0	12 11	8 12	14 2	
Bareilly -	9 15	14 4	19 11	15 0	14 15	13 8	17 15	19 5	12 12	8 11	14 9	
Lucknow -	11 0	13 12	15 7	13 1	10 8	14 11	20 1	21 12	12 15	9 1	14 3	
Fyzabad -	10 15	13 0	15 12	12 15	15 6	14 8	19 13	21 8	13 1	9 3	14 9	
Allahabad -	10 13	14 3	15 9	14 8	14 5	13 9	18 3	21 7	15 3	10 4	14 13	
Gorakhpur -	15 1	19 1	22 15	18 4	17 11	14 4	22 7	23 11	14 0	10 12	17 13	
Benares -	9 5	12 9	11 13	11 15	12 11	10 15	16 5	19 11	14 9	11 5	13 2	
Jhansi -	7 4	10 4	10 4	9 11	12 4	13 7	14 11	16 4	13 9	8 12	11 9	

VERAGE PRICES OF COMMON RICE FROM 1869 TO 1878.

AVERAGE PRICES OF ARHAR FROM 1869 TO 1878.													
Meerut	-	11 0	16 3	24 8	23 13	24 4	15 11	18 4	27 3	21 7	9 11	19 3	(four years). (five years).
Agra	-	10 5	18 1	26 5	22 10	17 15	14 5	19 0	28 7	20 0	9 15	18 11	
Cawnpore	-	11 14	16 13	24 0	19 9	18 8	14 4	21 1	28 12	18 11	9 3	17 6	
Barcilly	-	9 0	17 0	26 5	20 13	19 3	14 7	16 13	25 8	18 1	9 5	17 9	
Lucknow	-	15 13	21 4	31 15	22 15	No returns.						23 0	
Fyzabad	-	17 11	13 15	20 9	16 0	17 9	No returns.						17 3
Allahabad	-	10 4	14 8	19 12	17 13	15 15	14 9	19 11	27 3	21 0	9 7	17 0	
Gorakhpur	-	13 8	12 15	19 9	14 13	16 1	13 0	20 3	28 12	18 13	9 8	16 11	
Benares	-	9 3	11 11	14 15	14 1	13 9	11 11	15 15	20 9	17 1	8 11	13 11	
Jhānsi	-	6 10	17 3	25 0	18 9	13 11	12 3	14 9	21 5	15 11	8 8	15 5	

AVERAGE PRICES OF ARHAR FROM 1869 TO 1878.

Prices.—The answer to question 16 has been exhibited in tabular form in the accompanying statement. The year 1876-77 was a fair average year, and the prices ruling during that period were fairly normal prices. The table for the year 1873-74 shows the convergence towards, that for the next year the divergence from, famine prices. The figures in column 3 of annexure II. give what may be taken as the fair average normal price for rice, the great staple article of food over all Bengal. Other averages are given in the answer to question 19. Prices usually rise at two seasons of the year ; *firstly*, before harvest, when the safety of any crop is assured, and *secondly*, after harvest, when it has been threshed out. In the one case the old surplus stocks are brought into the market, in the other the new grain. In some parts of Bengal prices rise in the interior of each district during the months of July, August, and September, owing to the difficulties of transport in the rainy season ; in other districts, such as those of Eastern Bengal, where the internal communication is chiefly by water, prices tend to fall during these months. But, generally speaking, the food markets are affected chiefly in the manner explained above. Of late years, owing to the improvement of communications and the stimulus given to the grain trade by recent famine operations, a third and most important element of fluctuation has been introduced, viz. the demand for export to other districts or provinces, and the people, as others have done before them, are learning that what are called the blessings of civilisation do not always carry with them an improvement in their social condition. In former years surplus stocks were kept by the people because there was no market for them. The holders could afford to pay liberally in grain for field labour after putting aside sufficient for their own wants. Now they are tempted by high prices to sell off these stocks. If famine comes they have to buy at higher prices than those at which they sold : they incline to pay for field labour in cash instead of in grain, and the labourer consequently finds his stomach more empty than it was, especially where, as in Behar, the rate of wages has not risen proportionately with prices. The pinch

of short rations is spread over a larger area and borne by a greater number than before; but it is none the less a pinch when it comes, and it comes now more frequently. It seems likely that the enormous stimulus recently given to trade in grain will have the effect of altogether revolutionising the economic conditions of the food-supply of Bengal. It has hitherto generally been held that any rise in price which quoted the staple food-grain at less than 12 seers to the rupee would indicate the approach of scarcity and the non-existence of large stocks; and that the non-landed and poorer artisan and shopkeeping class would feel this pressure, and could tide it over for only a short time; while prices ranging between 10 and 8 seers per rupee would denote scarcity requiring relief measures, and anything below 8 seers would indicate the existence of famine. But in fact all such calculations have been to a great extent falsified by the experience of the past year. Prices which would have been deemed famine prices in 1874 have been borne by the people of many districts without the appearance of any actual distress. The profits of the agriculturist have been so high that he has been able to hold on and support his field labourers in a manner perfectly surprising. Moreover the local circumstances of nearly every district in Bengal vary and differ so much that what would indicate famine in one does not necessarily do so in another.

A reference to the statement will show that in 1873-74 the rise in prices was fairly gradual, and that at no time was there any absolute deficiency of supply owing to famine such as there was in Orissa in 1866. In the present improved state of the trade and communications of the province, any future scarcity is not likely to be attended or marked by any very sudden rise or fluctuation.

When scarcity supervenes, and the prices of the ordinary grains rise, the people are driven to purchase the coarser and cheaper food-grains; the demand for these increases, and their price rises in greater proportion than that of the dearer classes of food, but ever to such an extent as to produce equality.

STATEMENT showing MONTHLY VARIATIONS in the RETAIL PRICES of FOOD in selected DISTRICTS of BENGAL during the years 1873-74, 1874-75, and 1876-77.

[illegible]

CENTRAL PROVINCES.

I have selected Saugor for the extreme north, Hoshangabad for the Nerbudda Valley, Seoni for the Satpura districts, Wardha for the Southern districts and Raipur for Chhattisgarh. These districts appear to be the fairest, being free from large cities, large military stations, and exceptional circumstances, and in the following table I have shown the range of prices for December, January, February, and of May

and June for the year 1866-67, for 1872-73, and again, with a view to show the progress of the present tightening of prices, for the three past years. This present dearness of grain is caused, as already shown, by the famine in the west and south of India by exports to England, and by the blight which nearly destroyed our rabi crops in the spring of this year.

STATEMENT showing Price Current of Food-grain in certain Districts of the Central Provinces.

	1866-67.				1872-73.				1875-76.				1876-77.				1877-78.			
	December.	January.	February.	May.	June.	December.	January.	February.	May.	June.	December.	January.	February.	May.	June.	December.	January.	February.	May.	June.
Saugor.																				
Wheat	12.2	12.5	15.5	20.10	19.14	16.1	15.8	14.1	16.8	14.9	20.	26.	25.	23.10	25.	18.	15.8	14.	15.	14.
Rice (common)	10.7	11.0	11.3	11.13	12.3	14.	14.	12.1	10.2	11.2	17.	17.	15.	14.8	14.8	7.8	8.	6.	6.8	7.
Millets	19.0	20.15	23.9	26.13	26.	24.2	24.2	23.3	22.4	—	35.	32.	32.	—	—	21.	18.8	17.	—	—
Lesser Millets	—	—	—	—	—	37.3	37.3	37.3	—	—	—	—	23.	—	—	—	—	17.	—	—
Hoshangabad.																				
Wheat	12.	13.	14.8	15.	14.	14.5	13.6	15.4	18.8	16.7	17.8	18.	17.8	16.	17.7	16.	15.12	12.	10.2	9.
Rice	8.	8.	8.	7.8	8.	10.3	12.1	13.	11.4	11.1	13.	13.8	12.6	10.12	11.4	5.10	7.14	6.12	6.12	6.3
Millets	18.	22.	20.	15.	12.	24.3	26.1	19.5	19.5	—	—	19.	19.8	—	—	18.4	20.	14.10	13.	11.8
Lesser Millets	—	—	—	—	—	22.4	20.5	20.5	—	—	—	—	19.	—	—	14.6	18.	13.8	12.6	—
Seoni.																				
Wheat	13.	15.	18.	24.	26.	25.2	25.2	24.2	27.	25.2	33.	24.	23.5	25.	25.	22.	20.	12.	11.	10.
Rice	12.	12.	12.	11.	10.	14.9	14.9	16.8	14.9	14.9	23.	25.	23.	20.	16.	16.	15.	10.	10.	10.
Millets	20.	20.	25.	20.	—	29.8	29.8	30.8	24.2	23.3	—	32.	—	—	—	—	—	—	—	—
Lesser Millets	—	—	—	—	—	32.6	32.6	32.6	32.6	26.1	—	—	—	—	—	—	—	—	—	—
Wardha.																				
Wheat	10.3	10.7	11.3	13.6	13.15	16.3	15.8	17.7	16.3	15.8	24.6	20.	19.1	19.6	16.6	17.	15.	15.	11.	11.
Rice	8.13	9.4	9.15	10.	10.10	11.2	11.2	11.2	11.2	9.3	12.12	14.	13.9	12.3	13.	9.8	9.	8.12	9.8	8.8
Millets	18.13	17.2	19.2	22.	20.15	21.4	22.4	22.4	21.4	20.5	42.15	23.11	21.12	18.7	18.13	19.	17.	17.	17.8	18.
Lesser Millets	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Raipur.																				
Wheat	17.	18.	18.	32.	46.	44.8	44.8	49.5	44.8	37.3	52.	56.	56.	44.	44.	32.	32.	24.	20.	17.
Rice	16.	16.	16.	24.	26.	26.1	44.8	44.8	40.1	37.3	34.	38.4	38.	34.	32.	26.	23.	21.	20.	19.
Millets	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Lesser Millets	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

CHAP. I. QN. 16.

CENTRAL
PROVINCES.

Mr. Nicholls.

My figures do not conclusively indicate any usual variation between the prices at harvest time and other times of the year, and experience does not warrant any conclusion.

It would be impossible to predict the approach of alarming scarcity solely from an examination of the local price current. It is absolutely necessary for a deputy commissioner to have a fairly correct idea of stocks, out-turn trade, and especially of the export trade, not only of his own district, but of neighbouring districts, and of neighbouring territories and Provinces. Without this, his own price current would only mislead him.

Before the severe scarcity of 1868-69 on our black

cotton soils, and in the northern districts prices had been tightening for three years, and it was chiefly the purchasing power of the people which at length failed. The prices which ruled in the worst times were not much higher than our present rates.

But in the rice countries there was a rise, after the single failure of the staple crop in 1868, of nearly 50 per cent. in four months, after which it remained nearly stationary. The prices of other staples were similarly affected. Here the rise was sudden.

I will compare the prices of wheat and rice in the early part of 1868 with those for the corresponding period of 1869 for Bhandara and Raipur :—

		January.		February.		March.		April.		May.	
		1868.	1869.	1868.	1869.	1868.	1869.	1868.	1869.	1868.	1869.
Bhandara -	{ Wheat -	25	11	20	10	23	11½	22	11½	22	10
	{ Rice -	28	11	25	11½	24	10½	19	10½	20	9½
Raipur -	{ Wheat -	48	14	44	16½	52	16½	52	16½	52	15
	{ Rice -	40	13½	40	14	44	14	40	13½	40	12

This table does not show very clearly that the ordinary difference in the relative price of wheat and of rice was lost sight of.

In Nagpur and Wardha where jowari ordinarily is from ¼ to ½ cheaper than wheat, at a time when there was an excessive demand for jowari for the Deccan, and a fair demand, but a want of railway carriage, for wheat for export via Bombay to England, jowari was in 1877 sold dearer than wheat.

In ordinary years we may see marked fluctuations in the relative prices of wheat and of rice in the same district. For instance, at present in Seoni, where this year the wheat crop was almost entirely lost, wheat

and rice are selling at the same rate, 10 seers for a rupee. But I find throughout 1866-67 and 1872-73, and up to December in 1875, wheat sold cheaper than rice. In that last month wheat was at 33 seers and rice 23. In the next month wheat went to 24 and rice to 25, next month wheat sold at 30 and rice at 27. Since then wheat has been cheaper than rice, but gradually approaching till June 1878, when the price stands at 10 seers the rupee for either sort. This is due to the loss of the wheat crop.

But I think, generally speaking, during our famine of 1863-69 the various sorts of grain maintained their ordinary relative values.

BERAR.

Mr. Dunlop.

BERAR.

I have selected the Yeotmal taluka of the Wun district as a typical district in the upland country off the railway line, and the Amraoti district as a typical

district in the low-land country which has railway communication.

The rates for jowari and wheat in these two districts have been as follows :—

		Jowari.		Wheat.	
		Seers per rupee.		Seers per rupee.	
		Amraoti.	Yeotmal.	Amraoti.	Yeotmal.
1861-62	- - -	—	40	—	20
1862-63	- - -	—	27	—	12
1863-64	- - -	30	19	20	11
1864-65	- - -	16	24	16	10
1865-66	- - -	32	24	16	9
1866-67	- - -	20	24	8	8
1867-68	- - -	25	22	16	10
1868-69	- - -	15	18	10	10
1869-70	- - -	25	25	11	10
1870-71	- - -	30	22	12	10
1871-72	- - -	22	22	14	12
1872-73	- - -	32	22	16	16
1873-74	- - -	32	45	15	16
1874-75	- - -	46	60·25	19	23·75
1875-76	- - -	48·5	45·25	24·75	23·75
1876-77	- - -	21½	11	15	19½
1877-78	- - -	14	17	11	10
1878-79	- - -	17	20	10	10

B.

RAGI.

AVERAGE PRICES during the Three Years ending 1875-76 in terms of Seers of 80 Tolas.

Districts.	July.	August.	September.	October.	November.	December.	January.	February.	March.	April.	May.	June.
Ganjam -	36.76	34.65	36.33	41.49	41.60	39.82	38.83	38.99	38.90	38.49	37.57	36.94
Vizagapatam -	31.02	30.20	31.10	34.79	34.85	34.54	33.27	32.57	32.83	32.41	32.05	30.22
Godavari -	34.66	33.99	34.23	34.50	36.06	35.91	36.30	36.87	36.14	37.14	36.29	36.39
Kistna -	29.98	29.28	29.30	28.99	29.38	31.46	32.67	33.83	34.86	34.42	34.34	34.08
Nellore -	29.51	28.64	27.62	27.86	27.43	26.49	26.45	26.56	27.08	27.69	29.00	29.41
Cuddapah -	31.47	30.25	30.95	30.76	30.09	29.69	29.06	28.87	29.50	30.20	30.60	30.71
Bellary -	33.16	31.89	31.90	26.07	24.90	26.55	26.47	26.73	27.45	28.24	28.20	27.27
Kurnool -	27.97	26.71	24.90	26.07	24.90	26.55	26.47	26.73	27.45	28.24	28.20	27.27
Madras -	24.83	24.66	25.08	24.48	24.66	24.26	23.40	23.11	23.18	22.95	23.05	22.28
Chingleput -	25.07	24.28	24.34	26.12	26.10	25.06	23.64	23.54	23.63	23.93	24.10	23.68
North Arcot -	30.98	29.05	30.02	30.44	29.97	27.88	26.11	25.61	25.88	25.89	26.64	26.22
South Arcot -	25.88	25.14	27.08	30.16	31.23	29.55	27.16	26.65	25.65	25.52	25.11	24.88
Tanjore -	25.85	26.07	27.42	29.69	31.78	30.77	29.30	26.74	27.44	27.03	26.12	26.71
Trichinopoly -	26.56	25.52	25.58	27.71	29.22	28.71	28.92	26.98	25.55	26.62	26.03	25.56
Madura -	29.51	29.26	29.32	28.93	28.79	30.90	29.84	29.30	29.27	30.02	30.10	28.57
Tinnevely -	24.12	23.65	24.27	24.57	24.55	26.43	27.35	26.49	26.69	26.36	25.30	24.48
Coimbatore -	27.19	26.62	25.80	27.55	28.41	27.19	26.28	26.21	25.80	25.51	25.00	25.00
Nilgiris -	18.02	18.16	17.87	17.46	17.85	18.30	17.79	17.83	17.33	17.22	17.23	16.82
Salem -	29.69	30.52	30.31	30.91	30.65	28.86	26.47	26.09	26.70	27.89	27.69	27.28
South Canara -	20.48	20.45	20.71	20.81	21.64	22.01	22.34	22.02	21.51	20.92	20.09	19.55
Malabar -	22.76	23.28	23.72	24.20	23.56	23.35	22.16	22.37	21.51	21.08	20.20	20.05

C.

CHOLUM.

AVERAGE PRICES during the Three Years ending 1875-76 in terms of Seers of 80 Tolas.

Ganjam -	28.56	28.35	28.70	28.22	29.77	29.90	29.78	32.88	31.51	31.02	28.45	27.27
Vizagapatam -	31.44	30.53	30.23	30.54	32.32	33.90	31.98	33.98	33.60	31.81	32.14	27.73
Godavari -	31.82	31.39	31.46	32.15	32.24	32.66	34.38	36.29	36.86	37.16	36.32	35.50
Kistna -	23.68	23.99	24.77	25.42	24.96	26.58	27.78	29.02	29.13	28.57	27.88	27.35
Nellore -	25.79	25.37	24.13	24.40	24.15	23.86	24.26	24.71	24.55	25.61	26.03	26.39
Cuddapah -	28.36	27.39	27.93	27.71	27.96	27.38	26.70	26.81	27.02	27.09	27.82	27.90
Bellary -	29.34	29.04	28.25	28.58	29.56	29.05	28.88	28.70	28.89	28.76	28.67	27.94
Kurnool -	25.69	25.17	24.03	25.07	26.67	26.46	27.66	28.13	28.40	27.97	27.12	25.97
Madras -	22.32	22.32	21.24	21.96	21.96	22.44	20.46	20.32	20.65	19.61	20.10	20.15
Chingleput -	19.74	20.21	20.07	19.70	20.90	20.72	17.60	20.46	17.63	19.62	18.45	19.08
North Arcot -	26.44	27.81	28.16	28.03	26.28	25.64	22.19	22.51	23.20	23.54	24.67	23.34
South Arcot -	28.29	26.51	26.00	26.77	30.03	30.09	29.07	27.92	26.53	28.60	26.51	27.52
Tanjore -	22.78	22.07	23.19	22.83	27.74	26.86	23.11	24.42	24.51	25.59	24.06	24.06
Trichinopoly -	29.78	24.07	25.73	25.38	26.04	26.65	28.68	31.85	28.87	34.10	32.64	31.21
Madura -	32.97	30.99	29.08	28.82	29.65	31.32	31.34	33.12	34.17	32.79	34.07	31.32
Tinnevely -	23.91	23.57	23.83	23.78	23.46	23.28	23.40	23.20	23.91	25.84	22.35	22.37
Coimbatore -	21.99	21.82	21.32	20.81	21.72	22.21	21.21	21.00	21.36	21.14	21.18	21.17
Nilgiris -	17.00	16.97	16.84	16.85	16.90	16.99	16.4	15.28	15.81	14.96	14.03	15.0
Salem -	26.52	27.05	26.33	26.74	25.74	25.21	24.33	23.92	23.11	24.25	23.90	24.01
South Canara -	—	—	—	—	—	—	—	—	—	—	—	—
Malabar -	—	—	—	—	—	—	—	—	—	—	—	—

D.

CUMBU.

AVERAGE PRICES during the Three Years ending 1875-76 in terms of Seers of 80 Tolas.

Ganjam -	28.16	29.93	34.67	35.21	35.53	32.97	31.53	32.28	31.97	30.58	31.42	31.44
Vizagapatam -	31.52	31.59	35.47	38.65	37.76	38.25	36.20	35.31	33.42	33.87	33.81	30.75
Godavari -	34.14	34.32	35.42	36.34	36.59	36.96	36.97	36.40	36.34	37.24	37.19	35.94
Kistna -	26.58	24.71	23.96	27.33	27.61	28.33	28.92	30.23	29.83	29.15	29.47	28.40
Nellore -	22.90	22.56	22.43	24.82	26.01	24.34	24.15	23.81	23.69	23.79	23.20	23.11
Cuddapah -	29.20	28.40	29.04	29.88	29.91	28.76	27.85	27.72	27.27	27.53	27.88	27.89
Bellary -	26.60	25.83	25.68	25.00	25.69	26.33	26.37	26.56	26.53	26.37	25.67	25.18
Kurnool -	22.29	23.72	23.83	25.34	25.99	24.74	25.51	26.92	25.17	26.27	24.15	23.74
Madras -	20.24	20.24	20.68	20.24	20.24	20.68	19.80	19.36	19.36	19.36	19.36	19.36
Chingleput -	26.16	25.08	22.44	21.57	23.32	22.44	22.35	23.29	19.36	19.36	19.36	19.36
North Arcot -	25.08	25.76	25.97	27.15	26.60	25.61	23.90	22.60	22.81	22.15	22.15	22.26
South Arcot -	24.24	26.53	27.92	29.81	30.46	28.28	25.46	24.85	24.01	23.94	23.41	23.55
Tanjore -	24.38	23.36	24.76	28.20	30.14	29.67	27.92	25.30	24.13	23.53	22.48	22.97
Trichinopoly -	24.08	23.97	23.63	25.67	28.94	29.01	20.31	26.16	24.44	23.91	23.52	23.52
Madura -	28.00	27.02	27.51	27.56	27.87	28.74	28.56	28.13	28.39	29.12	28.45	27.32
Tinnevely -	21.47	20.71	21.25	20.57	20.67	21.62	23.66	25.09	25.59	24.30	22.40	21.53
Coimbatore -	25.40	25.69	24.58	25.05	26.30	27.61	26.96	25.31	25.33	25.04	24.21	23.97
Nilgiris -	15.64	16.27	16.61	15.43	16.58	16.53	16.66	16.25	15.66	15.54	13.79	14.89
Salem -	25.23	27.17	28.38	28.62	29.24	28.29	25.58	24.35	23.82	23.92	28.70	23.41
South Canara -	—	—	—	—	—	—	—	—	—	—	—	—
Malabar -	—	—	—	—	—	—	—	—	—	—	—	—

Though, on the whole, prices seem to run lower at harvest time than at other times, it is by no means invariably the case. From the tables given above it appears that in Ganjam, which may be taken as a typical district for ragi, the average monthly prices for the three years in question varied from 41.60 seers per rupee in November to 34.65 seers in August, the latter month being also the harvest month. In Salem,

where the ragi harvest is in October, the highest price appears to have been reached in February, and the lowest in August.

The limit of ordinary annual variation in prices may be gathered from the following table, which has been abstracted from the tables of averages above given, and shows the per-centage of increase over the lowest price :—

CHAP. I. QN. 16.

MADRAS.

Board of Revenue.

E.

Districts.	Rice, Second Sort.		Cholum.		Cumbu.		Ragi.	
	Limits of Variations.	Per-centage of Column 2 to lowest Price.	Limits of Variations.	Per-centage of Column 4 to lowest Price.	Limits of Variations.	Per-centage of Column 6 to lowest Price.	Limits of Variations.	Per-centage of Column 8 to lowest Price.
1	2	3	4	5	6	7	8	9
Ganjam -	2.01	9	5.61	17	7.37	21	6.95	17
Vizagapatam -	2.44	12	6.25	18	7.13	18	4.65	13
Godavari -	2.94	13	5.77	15	3.10	8	3.15	9
Kistna -	2.61	14	5.45	19	6.27	21	5.66	16
Nellore -	1.59	9	2.53	10	3.58	13	3.28	11
Cuddapah -	1.64	9	1.66	6	2.64	9	2.60	8
Bellary -	0.99	6	1.62	5	1.69	6	3.20	9
Kurnool -	0.84	5	4.37	15	4.63	17	3.34	11
Madras -	1.61	11	2.83	12	1.32	6	2.80	11
Chingleput -	0.80	5	3.30	16	9.10	35	2.58	10
North Arcot -	2.06	11	5.97	21	5.00	18	5.37	17
South Arcot -	1.55	9	4.09	13	7.05	23	6.35	20
Tanjore -	1.60	10	6.76	23	7.66	25	5.93	19
Trichinopoly -	1.51	10	10.03	29	5.49	19	3.70	13
Madura -	1.44	9	5.35	16	2.10	7	2.33	7
Tinnevely -	1.06	8	3.49	13	5.02	20	3.70	13
Coimbatore -	0.80	6	1.40	6	3.64	13	3.41	12
Nilgiris -	0.62	6	2.97	17	2.87	17	1.48	8
Salem -	1.21	8	3.94	15	5.83	20	4.82	15
South Canara -	1.43	10	—	—	—	—	2.79	12
Malabar -	1.35	10	—	—	—	—	4.15	17

The Board do not think that it is possible to state definitely what rise in price would indicate the approach of alarming scarcity; but any rise in excess of what is shown above as an ordinary fluctuation would afford cause for anxiety if the season were also known to have been unfavourable.

It is only as regards two famines that sufficient information is available to permit of the effect on prices being traced in detail. The statement given below shows the nature of the rise in certain typical districts :—

	Rice.		Ragi.		Cumbu.			Cholum.	
	Trichino- poly.	Madras.	Ganjam.	Salem.	Vizagapa- tam.	Cuddapah.	Tinnevely.	Kurnool.	Bellary.
1866.									
January -	11.2	12.3	13.3	18.2	18.5	14.1	13.8	14.3	12.1
February -	10.4	11.0	13.5	16.8	13.7	13.7	16.0	13.8	12.2
March -	10.6	11.0	14.2	16.7	17.8	13.9	16.0	14.5	10.2
April -	10.7	11.3	14.1	16.7	17.9	13.2	14.8	14.0	11.2
May -	10.7	11.1	12.8	16.6	17.6	13.7	14.7	13.6	—
June -	10.3	10.4	10.2	13.5	27.1	13.2	13.4	12.9	8.8
July -	8.4	9.2	10.5	11.6	15.1	12.3	12.4	9.9	6.8
August -	8.1	8.7	11.5	10.3	16.1	10.2	11.6	9.0	5.8
September -	6.9	7.7	12.0	9.1	20.3	9.2	10.3	8.5	7.8
October -	6.5	8.0	16.7	11.0	23.1	11.6	10.3	10.8	9.9
November -	6.5	7.2	21.4	12.3	24.3	14.6	10.1	13.5	12.5
December -	7.0	7.2	22.7	13.0	33.8	14.7	11.6	14.1	—
1876.									
June -	14.5	15.2	35.8	22.9	30.0	24.3	22.7	26.8	24.6
July -	12.8	15.4	35.6	20.7	29.7	21.1	20.3	24.4	22.6
August -	12.8	14.1	32.9	20.1	30.8	19.7	19.8	21.5	20.5
September -	12.8	13.9	37.6	18.2	33.4	17.0	19.9	17.7	15.5
October -	13.0	11.7	39.5	14.6	29.5	11.5	19.9	9.3	10.5
November -	9.1	9.8	27.9	11.3	23.8	9.0	15.9	7.9	7.5
December -	7.0	7.8	16.9	8.7	18.4	7.5	11.4	7.0	7.5

CHAP. I. QN. 16.

MYSORE.

Mr. Lacey.

Mr. Lacey, Mysore.—The normal rate of prices is Rs. 3 per "Palla" of 100 seers of ragi, jola, gram, and paddy at harvest time, and rises to Rs. 4 or Rs. 5 at other times of the year. In 1872 gram was obtainable in the Mysore district, where I was located at the time, for Rs. 2 per palla, and could not obtain purchasers, at that rate gram being so abundant that several ryots resigned their lands, as their cultivation

MYSORE.

did not pay. This led to speculators purchasing and exporting gram, so that the market reached its normal state the next year. No distress need be apprehended so long as the price of grain did not exceed Rs. 5 per "Palla" of 100 seers; but distress among the poorest classes commences when prices rise above that limit, and when it reaches Rs. 10 per "Palla" we may safely say that we have come to the beginning of a famine.

RAJPUTANA.

Col. Beynon.

Colonel Beynon, Jaipur.—The normal rate of prices of each of the chief staples of food-grains at the principal centres of the State are, wheat 16 to 17 seers (80 tolas per seer) per rupee, barley 21 to 22 seers, and bajra 19 to 20 seers.

At harvest time these grains are usually (if the out-turn is an average one) each about 20 per cent. cheaper.

A rise in the prices of these grains to 11, 15, and 13 seers per rupee respectively, would indicate the approach of alarming scarcity.

During the severe scarcity in 1868-69 the highest selling rates of wheat, barley, and bajra were 6½, 8 and 7½ seers per rupee respectively, and in the famine just past, when the distress was of less severity and

RAJPUTANA.

duration, 9, 11, and 7 seers were the highest prices reached.

On both occasions the rise in prices was gradual, the advance continuing more or less uniform in respect to the different staples until the more critical and pinching condition was reached, when this uniformity ceased, and, as will be observed from the comparative rates above quoted, the prices of all staples became, as the distress waxed acute, more and more equalised, with the exception of bajra in 1877, the price of which was especially high owing to the great demand for this particular staple in our own provinces in the North-West, to which large quantities found their way from this part of the country about the sowing season of that year (June and July).

CENTRAL INDIA.

Mr. Wingate.

	Normal prices Seers per Rupee.	Harvest prices Seers per Rupee.	Scarcity prices. Seers per Rupee.
Bhopal -	25	30	12

Baghelkhand—

Rice -	15 to 20		
Urd and Masur	25 to 30		
Wheat }			
Bajra }	30		
Gram, Arhar }	35 to 40		
Barley, Juar }			
Pear, Kodoo }			
and Saman -	40 to 50		

N.B.—Prices are much cheaper in the more inaccessible parts.

Western Malwa.—

Jowar -	15 to 19	19 to 24	12
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Manpur.—"The ordinary variation between the prices of food grains at harvest and other times amounts to from 10 to 15 per cent. Looking to past times, wheat selling below 8 and jowar below 10 seers per rupee would indicate the approach of alarming scarcity. The rise and fall in prices are generally gradual and affect all the food grains, but not quite

uniformly, as will appear from the following statement of prices in 1873 and 1877.

Month.	1873.						1877.					
	Wheat per Rupee.	Gram per Rupee.	Jowar per Rupee.	Mukka per Rupee.	Dall per Rupee.	Wheat per Rupee.	Gram per Rupee.	Jowar per Rupee.	Mukka per Rupee.	Dall per Rupee.	Wheat per Rupee.	Gram per Rupee.
March -	13½	15½	21	23	10	15	15½	18½	19	10½	13½	15½
April -	14	15	21	23	10	15½	15½	18½	19	10½	14	15
May -	13½	14	21	24	10	14	18½	17½	20½	10	13½	14
June -	13	13	19	21	10	13½	16½	16½	18½	10	13	13
July -	13½	13½	19½	20½	10	13	16	15½	17½	9	13½	13½
August -	13½	14	19	20½	10½	12½	15½	17	16½	9	13½	14
September -	13½	13	18½	24½	11	11½	13	13	18	8	13½	13
October -	14	13	24½	35	11	11½	13½	13	19½	8	14	13
November -	14½	13	26	38	11	12	14½	18	21½	9½	14½	13
December -	15	14	26	38	12	13½	16½	19½	23½	12	15	14
January -	15	14	28	38	12½	12	16½	17	18	10½	15	14
February -	15	15	29	39	13	11½	14	14½	14½	9	15	15

The first was a year of fall and the second that of rise. But the fall in coarser grains was greater and more marked in the first year than the rise in the same grains in the latter compared to the richer grains."

HYDERABAD.

CHAP. I. QN. 16.

HYDERABAD.

Moulvi
Mahdi Ali.

The normal rate of prices of each of the cheap staples of food in some districts is given below in seers (of 80 tolas) per one *Hali Sica* rupee.

The approach of alarming scarcity would be indicated by a rise in prices of over 50 per cent.

NAME OF DISTRICT.	JOWARI.		BAJRI.		WHEAT.		COARSE RICE.	
	Normal value.	Prices at Harvest time.	Normal value.	Prices at Harvest time.	Normal value.	Prices at Harvest time.	Normal value.	Prices at Harvest time.
Aurangabad	25	30	25	30	15	20	—	—
Parbhani	26	31	26	31	18	22	—	—
Gulbarga	22	26	24	28	12	15	12	15
Medak	18	22	—	—	12	15	16	20
Nagar-Karnul	25	30	28	32	12	15	17	20
Haidarabad	18	22	—	—	10	12	10	12

In past times of severe scarcity, so far as is known, prices have not risen very suddenly, but by gradual degrees. But when prices once begin to rise, they do so almost every day, until scarcity prices are reached. All staples are equally affected. The rise in prices of the cheapest staples of food tends to almost equalise the prices of all staples. Jowari and rice, the normal prices of which widely differed in days of plenty, sold for very nearly the same rate during the famine of 1876. The market rate of jowari and rice then was about four seers per rupee.

The following tabular statement showing the import and export of goods in 1286 Fasli will give an idea of the state of trade in His Highness's dominions.

Number.	Names of Articles.	Imports.				Exports.			
		Weight in Maunds.	Value.	Customs Duty.	Percentage ad valorem.	Weight in Maunds.	Value.	Customs Duty.	Percentage ad valorem.
1	2	3	4	5	6	7	8	9	10
1	Grains -	25,06,153	Rs. 1,67,07,685	Rs. —	—	34,42,734	Rs. 2,29,51,556	Rs. 5,73,789	2.5
2	Fruits -	—	14,89,691	65,308	4.37	—	3,89,577	7,767	2
3	Oil seeds and oils -	9,603	1,12,760	4,534	4	7,69,560	55,44,284	2,32,706	4.2
4	Silk and cotton stuffs -	—	71,99,867	3,59,953	5	—	9,68,732	48,436	5
5	Cotton -	2,799	55,948	2,333	4	6,61,941	1,32,38,898	5,51,621	4.37
6	Cotton seeds, &c. -	—	7,180	258	3.56	—	2,01,943	7,480	3.75
7	Opium -	348	3,85,883	14,035	3.8	3	4,726	189	3.9
8	Indigo -	417	1,06,841	4,477	4.18	2,445	5,24,530	17,341	3.3
9	Scents and drugs -	—	45,54,105	1,22,038	2.7	—	19,24,329	65,572	3.4
10	Timber -	—	86,763	2,747	3.2	—	4,12,371	12,509	3
11	English spirits, wines, &c. -	—	1,32,081	6,604	4.8	—	—	—	—
12	Sugar, jagerry, &c. -	62,877	10,94,374	42,518	3.9	68,544	6,46,830	22,997	3.1
13	Paper, &c. -	—	1,39,643	5,546	3.97	—	1,49,729	9,222	6.1
14	Live stock -	—	6,87,848	33,410	4.86	—	19,11,871	90,158	4.7
15	Minerals -	—	28,89,688	99,941	3.46	—	2,07,088	7,063	3.36
16	Silk -	—	11,81,700	22,698	1.9	—	5,044	102	2.02
17	Miscellaneous -	—	33,50,885	1,67,512	5	—	2,39,433	11,972	5
	Total -	—	4,01,82,942	9,53,912	2.37	—	4,93,20,941	16,58,924	3.37
18	Mahuwa flower -	—	2,73,942	35,351	12.9	—	79,481	11,738	14.8
19	Salt -	—	58,43,494	7,75,304	13.2	—	—	—	—
	Grand total -	—	4,63,00,378	17,64,567	3.81	—	4,94,00,422	16,70,662	3.38

CHAPTER I.—QUESTION 17.

What is the state of your Province as to the activity of commerce? Has it an energetic and enterprising trading class? Do any of the districts subsist mainly on their own resources, and export and import little? Or is there an active and constant ebb and flow of trade?

PUNJAB.

Major Wace.

There is no part of the province which does not possess an active and enterprising trading class; and throughout the province there is an active and constant ebb and flow of trade. The trading classes are not confined to the larger towns, but are to be found in almost every village in the province. There is no district shut up to its own resources, even the mountainous parts of Hazára and Kangra possessing their local trade. Some idea of the character of the internal trade of the province will be formed from the appended account of the trade of the 19 chief trading towns, which is extracted from the Trade Report for 1873-74.

Internal trade.—The amount of the internal trade of the Punjab, as shown by the traffic carried on at the principal trading centres, fell from 684 lakhs of rupees in 1872-73 to 568 lakhs in 1873-74. In 1871-72 it was 926 lakhs. It is not likely that these returns give an adequate representation of the state of trade in the province. They take no account of the trade of any of the towns except the 19 which have been selected to give some idea of the transactions. And even in the case of these 19, no articles are entered which skirt the towns in transit without paying octroi duty, nor of those which are conveyed by rail without entering them. Still, as regards these 19 towns, they convey some idea of their internal transactions, and they must accordingly be accepted as demonstrating a considerable decline in such transactions. This decline has been accounted for in some cases by general trade having been sacrificed to demand for grain for the famine in Bengal, the effect of which is only partially shown in the returns.

In the case of the towns of the Gurgaon and Hissar districts, the trade is said to have been diverted by the opening of the Rájputána State Railway.

The relative importance of the 19 towns for the last four years is shown by the annexed table:—

Order of importance.

	1870-71.	1871-72.	1872-73.	1873-74.
Delhi -	2	2	1	1
Rewári -	16	15	14	14
Hissar -	13	13	15	13
Bhiwáni -	4	4	3	3
Umballa -	5	5	5	8
Ludhiána -	7	7	9	7
Simla -	17	18	18	18
Jullundur -	9	11	12	11
Kangra -	12	10	8	9
Amritsar -	3	3	2	2
Lahore -	6	9	7	5
Ferozepore -	11	6	11	12
Jhelum -	19	17	19	17
Pind Dádan Khan -	15	16	16	15
Gujráti -	18	19	17	19
Mooltan -	1	1	4	4
Jhang -	17	12	13	16
Dera Ismail Khan -	10	14	6	6
Pesháwar -	8	8	10	10

PUNJAB.

The most notable descents in this scale are Umballa, Ferozepore, Mooltan, Jhang, Pesháwar; while Lahore and Dera Ismail Khan show the greatest rise.

The internal trade of Umballa fell from 56 lakhs of rupees in 1872-73 to 21 lakhs in 1873-74. The Deputy Commissioner can only account for this remarkable decrease by supposing that the merchants of the city confined their speculations exclusively to dealings in grain on account of the Bengal demand. The greater portion of the grain collected at Umballa was despatched by rail without entering the town, to avoid all chance of dispute with the octroi contractors.

The decrease in Ferozepore is from 18 lakhs to 14 lakhs, but in 1871-72 the value of the trade reached 40 lakhs. No explanation has been given, but the returns of the bridge traffic, a few miles from Ferozepore, show an increase from 27 lakhs in 1871-72 to 41 lakhs in 1872-73, and 75 lakhs in 1873-74, so the decrease does not appear to be substantiated. The goods which pass the bridge, however, are to a great extent conveyed down the river by boat.

The falling off in the Mooltan trade was alluded to in last year's report. There has been a further decrease this year from 58 lakhs to 51 lakhs. A special report, received from the Commissioner of Mooltan, shows that this decrease is partly real, partly nominal. The cotton and indigo which used to come from Muzaffargarh and Dera Gházi Khan to Mooltan for local sale before export, is now exported direct to Karáchi. Boat-building is on the increase in these two districts, and the traders find it more profitable to locate themselves across the river and export direct.

On the other hand, octroi duty on cotton and indigo has been abolished in Mooltan, and the contractors are not interested in recording the import and export of these staples. The traffic is therefore under-estimated.

In Jhang the decrease has been from 15 lakhs in 1872-73 to 10 lakhs in 1873-74. The falling off is due to dullness in the Povindah trade, owing, it is said, to a glut in the Kábul market.

The falling off of the Pesháwar trade is under investigation, special inquiry having been made by Government. Since last year there has been a further decrease from 22 lakhs to 18 lakhs, which is accounted for by the exclusion from the returns of this year of transit goods entered in the bonded warehouse, which were shown in the returns for 1872-73.

The Lahore trade increased from 29 lakhs in 1872-73 to 36 lakhs in 1873-74. The causes assigned are—improved registration, and the active demand for grain resulting from the Bengal famine.

Dera Ismail Khan forms an emporium for the Povindah trade, which passes on to Okará, and is conveyed thence by rail. The rise in this trade was noticed last year. There has been a further increase this year from 30 lakhs to 33 lakhs of rupees. The construction of a bridge of boats over the Indus at Dera Ismail Khan during the year is an event worthy of being chronicled. The facilities of communication between Bhakkar and the Derajat thus afforded are great, and much appreciated by the people of the country and the Povindahs.

NORTH-WESTERN PROVINCES.

The best data on which an account of the trade of these provinces can be based are the statistics of railways, road, river, and canal traffic, collected under the administration of the local Department of Agriculture and Commerce. An account of the method in which statistics have been collected will be found in the appendix to reply 7, Part II. A., as well as in the trade reports herewith appended.

It must be understood that the period which the reports cover consists of 12 months from 1st April 1877 to 31st March 1878, but that railway statistics only commenced in October 1877. The report therefore only embraces six months of railway statistics, but since the submission of the report, new statistics for another six months have come in, which have been utilised in the following note.

For trade registration purposes, the railways of these provinces have been divided into blocks which correspond nearly with the administrative division of the province under Commissioners, and which are shown in the sketch map appended.

In the trade report for 1877-78, the statistics which had been collected were arranged under the following heads:—

EXTERNAL TRADE.

- (a.)—Foreign, *i.e.*, trade between the North-Western Provinces and Oudh and countries external to British India, *e.g.*, Nepal and Tibet.
- (b.)—British or provincial, *i.e.*, trade between the North-Western Provinces and Oudh and other British provinces or protected Native States within British India.
- (c.)—Trade between the North-Western Provinces and Oudh and the ports of Calcutta and Bombay.

INTERNAL TRADE.

- (a.)—Trade within provincial boundaries not crossing the frontier.
- (b.)—Town or municipal trade.

The rationale of the above divisions was to arrange information as to the amount and character of trade passing along different routes from one part to another of the province or from this province to other provinces, and required therefore geographical arrangement of traffic along principal routes. The present note, however, will deal more directly with the resources and needs of the province as regards principal commodities. So that while in the published report trade is primarily divided according to routes, in the present note the primary division will be according to commodities.

The most important factor in the distribution of trade by commodities is the character of the produce of each portion of the province. It will be useful at this place to refer to the general description which has been given of the physical features of this part of India in the reply to query 3, where the different circumstances of climate, soil, irrigation, &c., of the various sections of the province have been noticed. It was found convenient to divide the province into four belts (parallel with the Himalayas), of which the atmospheric and physical conditions are sufficiently diverse to justify demarcation, and it was noticed that the belts thus demarcated are crossed at right angles by a gradual change from dryness and sand to moisture and loam.

It was further noticed that the same circumstances which formed the basis of the distinction between the different geographical sections of the province have led to important differences in the class of crops grown in each. It will now be shown how this diversity of produce has been the chief factor in regulating the character of provincial traffic.

It is to be regretted that the only statistics with any pretence to completeness which are available are those for a year in which drought caused abnormal changes in the quantity of produce and in the direction of the movements of grain. At the same time it

may be explained that much of the information which is now given is based on independent inquiry as well as on the statistics of the report.

The chief articles of trade produced in these provinces, of which there is a surplus for export from the localities of their production to other provinces, countries, or localities, are cotton (including cotton manufactures), indigo, wheat, other edible grains, oil-seeds, sugar, and timber. Other articles of trade, such as hides, ghi, tobacco, &c., are of less importance, and may be classed together under the head of subordinate articles of trade.

On the other hand, the chief articles which the province or portions of the province need, and which are brought from outside, are European yarn and cotton cloth, iron and hardware, and salt. Of the chief articles supplied by the province some are produced, as above explained, in one part and some in another part of the provincial territory. There is therefore an internal ebb and flow in articles of provincial production in addition to the current of trade which cross the boundary.

Before proceeding, however, to notice in separate detail the trade in each of the "chief commodities," it may be convenient to give a very short description of the principal requirements of the provincial population. There are in the North-Western Provinces and Oudh about 42 millions of inhabitants whose individual wants are (with the exception of a very small per-centage) almost identical—even rich men living in very little better style than the lower classes. The wants of one family provide, therefore, an index to the requirements of all.

Food.—The ordinary food of a family consists of edible grains, salt, vegetables, spices, sugar, oil, milk, and "ghi," the product of milk, of which the first two are absolute necessities and the last two luxuries.

Clothing.—The clothing of the family consists mainly of cotton cloth, sometimes supplemented by blankets of wool, with leather shoes.

Houses.—The houses of villagers and the poorer town classes are made of mud, building with burnt bricks being almost entirely confined to towns; they are roofed and supported with wooden beams and doorways and thatched with local produce.

Utensils.—Household utensils are a few brass, copper, and iron pots and dishes, clay vessels, and stone flour mills.

Fuel is cow-dung supplemented by wood.

Lighting is obtained by oil, but, as a rule, natives use little lighting.

Tools.—Of agricultural implements, ploughs, well gear, mattocks, and trowels, are made of wood and iron; sugar mills of wood or stone, ropes of local fibres, and irrigation bags of leather.

Luxuries (not being food) are tobacco, fine cloth, and jewellery. Taking, therefore, first those articles of which a comparatively large quantity is required by each family, and which therefore (on account of the large multiplier of 42 millions) must be the chief commodities of supply and demand, we find that they are—

Edible grains.	Cotton.
Oil and oil-seeds.	Iron.
Salt.	Wood.
Sugar.	Stone.

Edible grains and oil-seeds are, as a rule, produced locally in sufficient quantities for consumption, the surplus being exported, but occasionally a local deficit compels an indraught to one part of the province or another.

There is a steady flow of the remaining articles of the list from the localities where they are produced to the places where they are not produced.

Other articles noticed in the earlier paragraphs are either provided locally or are so small in weight as not to be worth classing as chief commodities, *viz.*, milk, vegetables, spices, wool, tobacco, jewellery.

Passing now from the wants of the community as a congeries of individuals to the wants of the community

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NORTH-
WESTERN
PROVINCES.

Mr. Buck.

as a national body, we find that they are stone, iron, timber, bricks, and mortar, all of which are required for public buildings, bridges, railroads, &c., but of which the last two are usually provided at the place where they are wanted, while the first three have been already mentioned. The list already sketched need not, therefore, be amplified, and the chief commodities required by the province, whether produced locally or imported, are, therefore—

Cotton and cotton cloth.	Oil-seeds.
Edible grains.	Stone.
Iron and hardware.	Sugar.
Salt.	Timber.

The above articles, representing the chief wants of the people of India, are naturally the chief items in the internal trade of the country. But to these must be added some other articles, the production of which is stimulated by a demand outside Indian limits, whither they are exported via the ports of Calcutta and Bombay. The chief of these are wheat, indigo, and opium; wheat is already included under "edible grains," and indigo and opium will be added to the list.

The order in which these commodities will be noticed is that adopted in the classified list drawn up for trade registration purposes under the orders of the Government of India.

Cotton and Cotton Cloth.—Cotton is most successfully cultivated on the reddish light soil occurring in the western districts of these provinces (and on the banks of the Jumna), and on the black soil known as "már" or "cotton soil." In describing the belts into which the area of the provinces has been subdivided, it was noticed that red sandy soil was most prevalent in the north-westerly districts towards the Panjáb. In the sub-Himalayan and Rohilkhand belts, as well as in the Doab belt, it appears to be restricted to the western extremity, beginning to disappear in the Sháhjahánpur district, north of the Ganges, and in the Cawnpore district, south of this river.

Már soil is the rich black earth, supposed by some to be of peat formation, found almost exclusively in tracts south of the Jumna, and is known as the "cotton soil" of Central India.

The absence of cotton cultivation in districts of these provinces where it is not grown is probably due to unsuitability of climate as well as of soil, since it does not appear to thrive in damp localities. The general result is, that, owing to conditions of soil and climate, the cotton area is not precisely coterminous with the belt areas.

The cotton area may be divided into three tracts under each of which are given figures showing the area of cotton per head of population for certain typical districts.

I. First tract.—Western districts of Rohilkhand (Bijnor, Moradabad, and Budaun). East of Moradabad and Budaun cotton cultivation shows a marked decrease; thus the area per head is, roughly speaking, in Bijnor '05 of an acre, while in Bareilly it is only '017, and in Sháhjahánpur '01. Further east still, in Oudh and the Benares division, cotton cultivation almost disappears. In the Gonda district barely '001 of an acre is the average per head; and in Gorakhpur '003, while in Rai Bareli the average is as low as '0001.

II. Second tract.—The western districts of the Ganges-Jumna Doab.

In this tract the area of cotton cultivation reaches its maximum in the Aligarh district, where it averages per head '1 of an acre. Going north-west of Aligarh there is a gradual decrease, the average for Bulandshahr being '04, and for Meerut '03. South-east of Aligarh there is a corresponding decrease, the average for Etah being '07, for Etáwah '07, and for Farukhabad '02. In Cawnpore and Fatehpur there is an increase, the average being '06 in both. The increase is probably due to the cultivation on the high land bordering on the Jumna, and this would also appear the reason for the excess exhibited by Etáwah over the neighbouring district of Etah.

Cotton cultivation decreases below Fatehpur, the average for Allahabad being '01.

III. Third tract.—The trans-Jumna belt.

This is the tract in which black soil occurs.

There is also the light red soil in the region of the Jumna in the Muttra, Agra, and other districts near that river. The average for the Agra district is '1, the same as that of Aligarh. The area increases to the east till in Jalaun it is '11, and Banda '17, in both of which districts black cotton soil is found.

The area of cotton cultivation, then, may be described as an irregular belt, which, starting from the districts of Budaun, Moradabad, and Bijnor, sweeps round in a curve comprising all the Ganges-Jumna Doab districts to which the trans-Jumna region is appended as a fringe.

The weaving of cotton fabrics is somewhat restricted to the tracts in which the raw cotton is produced. The industry is not much centralised in particular towns or villages, except in the case of a few special kinds of cloth.

The available statistics of the internal trade of cotton bear out the deductions which have been made from the average area of cotton cultivation per head in the different portions of the provinces. Between the districts of Rohilkhand and those of the Meerut division, the trade in cotton and cotton-goods is not very considerable. This is as might be expected, since the Bijnor, Moradabad, and Budaun districts would appear to produce more than is needed for their own consumption, and any deficiency in the other Rohilkhand districts would be more easily supplied from them than from other districts across the Ganges. In the year 1877-78, however, raw cotton was exported by road from the Doab to Rohilkhand to the net amount of 16,939 maunds, while Rohilkhand sent 21,345 maunds (net) of cotton goods to the Doab. The failure of rain in that year, which was more severely felt in Rohilkhand than in the Doab, was probably the cause of any cotton being exported at all. And it is noticeable that about three-quarters of the amount exported went towards the Budaun and Sháhjahánpur districts, Bijnor and Moradabad only taking one-fourth. The export of cotton goods to the Doab is a good indication of the general character of the trade, since these were manufactured from the cotton crop of the previous year, which was of a normal character.

Most of the cotton goods (17,064 maunds out of 21,345 maunds) came from the Bijnor district, which, as we have seen before, took least of the raw cotton which crossed the Ganges into Rohilkhand. We are, therefore, justified in assuming that in ordinary years cotton and cotton goods are exported from the Bijnor and Moradabad districts, while they are, if anything, imported by the more easterly districts of Rohilkhand. The import of cotton into Rohilkhand from the Doab is, however, trifling when compared with that into Oudh. It was noticed that in the sub-Himalayan and penultimate belts cotton cultivation becomes scarcer and scarcer going eastwards. Accordingly, in the year 1876-77 (a normal year) the net exports from the Doab to Oudh by road alone amounted to 168,772 maunds of raw cotton, and 12,362 maunds of cotton goods, besides which 22,363 maunds of European cotton goods (valued at Rs. 23,08,466) were exported by road. Most of the exports were from the city of Cawnpore, through which passes the greater part of the cotton destined for Oudh and the trans-Gogra districts of the Benares division. The chief distributing mart in Oudh is Fyzabad, which receives cotton from Cawnpore by road and rail, and from Agra by rail.

From the trans-Jumna districts cotton crosses into the Doab in large quantities. The trade chiefly centres in Cawnpore, though a certain quantity is consigned to Allahabad, and some is sent in boats down the Jumna. In the year 1876-77 the city of Cawnpore received from Bundelkhand 79,124 maunds of raw cotton as well as cotton goods to the value of Rs. 3,12,448. In the year 1877, 38,242 maunds crossed the Jumna going towards Allahabad, and in the same year nearly 22,000 maunds were despatched by boats down the Jumna. Bundelkhand is well known for its cotton manufactures, those of Mau-Ránípur being especially notable.

The internal trade in cotton which passes between the other divisions of these provinces, will be seen from the appended returns of railway traffic for the year ending 30th September 1878. It will be understood that the trade indicated by these figures is exclusive of that with tracts lying outside the provinces, and with the ports of Calcutta and Bombay, except in cases where the cotton destined for export is first consigned to an intermediate mart, where it is collected for despatch beyond the limits of the provinces.

The appended statement shows the trade in raw cotton which passed by rail between each of the "blocks" in these provinces during the year ending September 30th, 1878. In "exports" only that cotton is included which was exported to other blocks within the provinces, and similarly in "imports" only that imported from the blocks within the provinces:—

Railway Stations within limits of							
Meerut Division.		Agra Division.		Allahabad Division.		Benares Division.	
Imports.	Exports.	Imports.	Exports.	Imports.	Exports.	Imports.	Exports.
2,953	7,882	7,702	4,432	5,783	5,221	7,029	171

Railway Stations on			
Oudh and Rohilkhand Railway.		Muttra-Háthras Railway.	
Imports.	Exports.	Imports.	Exports.
3,948	9,841	482	956

On these figures the only blocks the net exports of which are considerable are Meerut and the Oudh and Rohilkhand Railway. Agra, which has been mentioned as one of the chief localities for cotton cultivation, actually imported 3,270 maunds more than it exported. The large imports of Benares will have been expected, since but little cotton is grown there. It is noticeable, however, that the imports into the Meerut and Agra blocks (which may be considered abnormal) nearly all took place between the months of October 1877 and April 1878, when the local cotton crops had almost entirely failed from want of rain.

Some judgment as to the surplus cotton produce of each block may also be formed from the exports to Calcutta during the same year. These were as follows:—

From Railway Stations within limits of			
Meerut Division.	Agra Division.	Allahabad Division.	Benares Division.
5,661	14,363	17,724	7,492

From Railway Stations on the	
Oudh and Rohilkhand Railway.	Muttra-Háthras Railway.
4,664	238

The total exports to Calcutta amount to 50,162 maunds. Those to Bombay are insignificant (915 maunds). The exports from the Allahabad division are almost entirely from the city of Cawnpore, which is included in it. Those from Benares are chiefly from Mirzapur, and consist not in locally grown produce,

but in cotton collected there from other parts of the provinces. Before the extension of the East Indian Railway to Allahabad, Mirzapur was the chief cotton mart in Upper India, and though now most of its former trade has left it, yet it still retains a portion of the forwarding trade from the Rewah States.

It now only remains to notice the cotton trade which these provinces transact with neighbouring states or provinces. This may be summarised as follows, only net imports or exports being shown in each case. The figures for railway traffic are for the year ending September 30th, 1878, for road and river traffic for the year ending March 31st, 1877:—

From the under-mentioned provinces and states cotton was imported into the North-Western Provinces and Oudh.

Provinces and States.	Amount of net imports.		
	By Rail.	By Road.	Total.
Panjáb - - -	Mds. 5,101	Mds. 39,965	Mds. 45,066
Rajputana - - -	1,190	32,455	33,645
Bundelkhand and Rewah -	—	6,723	6,723
Central Provinces -	1,03,237	635	1,03,872
Bombay Presidency -	1,703	—	1,703
Total imports -	—	—	1,91,009

Cotton, on the other hand, was exported to Bengal and to the country of Nepal.

The net exports to Bengal were—by rail, 29,768 maunds, and by road and river, 19,196 maunds; total 48,964 maunds.

The net exports to Nepal were only 407 maunds.

These provinces, therefore, on the whole, imported cotton, the net imports being 90,561 maunds.

European Cotton Goods.—These are imported into these provinces chiefly via Calcutta, Bombay taking little or no share in the trade. In the year ending 30th September 1878, the total imports from Calcutta aggregated 1,91,428 maunds, while those from Bombay only amounted to 48,249 maunds. As might be expected, they all come by rail, their value prohibiting their exposure to the risks of road or water conveyance. The imports destined for consumption in these provinces are, to a great extent, engrossed by the three towns of Gházipur, Cawnpore, and Delhi (the last, although in the Panjáb, being intimately connected in commerce with the North-Western Provinces), whence they are distributed (1) from Gházipur to the districts of the Benares division; (2) from Cawnpore to those of the lower and middle Doab as well as to the greater part of Oudh; and (3) from Delhi to the districts of the Meerut and Rohilkhand divisions. The railway returns for the year ending 30th September 1878 show this very distinctly. Below is appended an abstract giving the total imports from Calcutta to the railway stations in each of the divisions of these provinces:—

Benares.	Allahabad.	Agra.	Meerut.
59,670	96,427	12,878	12,557
Oudh and Rohilkhand Railway.			
9,896.			

Nearly all that consigned to the Benares and Allahabad blocks went to the towns of Gházipur and Cawnpore respectively. It will be seen that the amount taken direct from Calcutta by the Agra, Meerut, and Oudh blocks was comparatively small; and as a fact they receive most of their imports second hand from Cawnpore or Delhi.

From the three centres of trade the cotton goods are passed on either by railway, road, or river. Thus in ten months of the year 1876-77, 8,496 maunds crossed the Gogra river at Barhal on their way from Gházipur to Gorakhpur and Basti; while in the year 1877-78 the exports to Nepal via the Basti and Gorakhpur districts, amounted to 2,888 maunds, most of which had been consigned from Gházipur. The course of cotton goods can be traced southwards

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towards Rewah, to which in 1877-78, 2,742 maunds were exported. The statistics of railway-borne traffic show that the amount re-exported from Gházipur by rail is but small.

From Cawnpore European cotton goods are re-exported by railway as well as by road. During the year ending September 30th, 1878, 5,000 maunds were consigned from the Allahabad block (chiefly the city of Cawnpore) to stations in the Agra block. The appended statements show the amount re-exported by road during the year 1876-77 to Bundelkhand, Oudh, up country, and down country, that is to say, in all four directions:—

Bundelkhand	-	-	-	10,648
Oudh	-	-	-	11,238
Up country, towards Agra	-	-	-	1,939
Down country, towards Allahabad	-	-	-	7,943

Of the share taken by Bundelkhand, 216 maunds were passed on to the native states of Chatarpur, &c., and from Oudh 1,282 maunds were passed on into Nepalese territory.

We have as yet no satisfactory statistics showing the amount of European cotton goods re-exported by rail from* Delhi to these provinces. In the year 1877-78, 2,833 maunds were exported by road from Delhi across the Jumna bridge into the Meerut division, while the exports by road towards Muttra were only 128 maunds. From the Meerut division European cotton goods find their way across the Ganges into Rohilkhand, and thence to Nepal and the hill districts. In the year 1877-78 the amount thus exported to Rohilkhand came to 6,008 maunds, of which 1,615 maunds were passed on to Kumaun and Garhwál.

The various threads of the trade in European cotton goods have thus been traced as they ramify throughout the country from the three centres of Delhi, Cawnpore, and Gházipur, each of which towns draws its supplies direct from the port of Calcutta.

Indigo.—The indigo plant is cultivated to a greater or less extent throughout these provinces, though its cultivation is most extended in those districts which possess the advantages of canal irrigation. It is somewhat extensively grown in the Benares division, though not so much so as in the neighbouring Bengal province of Tirhoot. Figures showing the per-centage of indigo area to total cultivated area are given for some typical districts, from which some idea can be formed as to the comparative extent of its cultivation in the different portions of the provinces.

Meerut Division.	Rohilkhand Division.	Agra Division.
Meerut - .57 Aligarh - 4.8	Budaun - .13	Agra - .77 Etawah - 3.62 Cawnpore - 3.84
Allahabad Division.	Benares Division.	Oudh.
Allahabad - .03 Bánda - .01	Gorakhpur - .71	Gonda - .01 Partabgarh - .47

It is noticeable that indigo cultivation, like that of cotton, reaches its maximum in the Aligarh district, above which it rapidly decreases; in the Saháranpur district it is very rare. Below Aligarh it keeps very much to those districts which lie towards the centre of the Ganges-Jumna Doab, along the line of the Ganges Canal. In districts off this line, e.g., Agra, there is very little indigo grown. The Ganges Canal ends at Cawnpore, and in the portion of the Doab below Cawnpore indigo cultivation is but little carried on, as is

* NOTE.—In the year ending September 30th, 1878, the railway imports from the *Panjab* amounted to 24,613 maunds. Most of this must have come from Delhi. It was chiefly consigned to the following blocks—

Oudh and Rohilkhand Railway.	Meerut.	Agra.
10,835 maunds.	6,150 maunds.	4,704 maunds.

also the case in the district of Bundelkhand, in which there is very little irrigation. Although indigo cultivation would thus seem to follow on an extensive supply of water, yet north of the Ganges, in the damp climate of Oudh and Rohilkhand, there is comparatively little indigo grown. Beyond the limits of the Ganges Canal its cultivation seems to centre in the Benares division.

Without going into details, which would be out of place in this note, it may be stated that there are two methods of preparing indigo cake practised in these provinces, differing in the treatment of the dye when it has been extracted from the plant leaves. According to one method this is boiled before being made up into cakes, while according to the other it is merely strained and pressed. The former is practised in indigo factories owned or managed by Europeans, and is the only way in which indigo cake destined for export to Calcutta is prepared. In the latter way is made a great deal of the indigo cake manufactured for consumption in the country.

The trade in indigo is only important in respect to that which is exported to Calcutta, trade in indigo destined for consumption in this country being of scarcely more interest than that in the various other dyes which are locally produced or utilised. Thus in the exports from these provinces to the Panjab safflower figures as 18,501 maunds, while indigo is only 1,018 maunds. It is then solely as an export to the port of Calcutta that indigo is deserving of notice, and the proportion in which the different portions of the provinces contribute to this may be judged from the subjoined table, which shows the amount of indigo cake exported by rail to Calcutta from each block during the year ending September 30th, 1878:—

From Stations within the limits of the				From Stations on the		Total.
Meerut Division.	Agra Division.	Allahabad Division.	Benares Division.	Oudh and Rohilkhand Railway.	Muttra-Háthras Railway.	
19,246	10,661	7,046	5,681	3,716	371	46,121

These figures bear out the deductions, which were based on the per-centage of indigo cultivation, in making the Meerut and Agra divisions by far the largest exporting blocks.

So far as European enterprise is concerned, it seems admitted that indigo manufacture in these provinces has very much declined in the last 15 years, and this is evidenced by the number of factories which have been either abandoned altogether or sold for the most trifling sums. This may be due in part to the low price which indigo from these provinces now fetches in the Calcutta market, and in part to the competition of native manufacturers. In the last Calcutta price list, dated January 24th, 1878, it is noticeable that prices for Aligarh, Bulandshahr, and Mainpuri indigo vary between Rs. 172 and Rs. 132 8 0 per maund, the average price obtained being about Rs. 150. The prices rise as one goes down country, Benares indigo fetching Rs. 200, and Tirhoot averaging from Rs. 233 to Rs. 176. It is said that the indigo obtained from plant irrigated by canal water is inferior in quality as well as less in quantity than that from land irrigated from wells, though whether this has much connexion with the low prices of indigo from the canal irrigated districts of the Meerut and Agra Divisions may be a matter of doubt. At these low prices indigo cannot be manufactured at any great profit under European management, though native landholders, it is admitted, can do so, their position enabling them to obtain both labour and plant from their own villagers at far lower rates than European planters can bargain for.

In connexion with indigo may be mentioned the trade in indigo seed, which is an important item in the exports of these provinces to Behar and Bengal. It is found there that far better results are obtained from

seed imported from these provinces than from that locally produced. In the year ending September 30th, 1878, nearly 130,000 maunds of indigo seed were exported by rail from these provinces to Behar alone. A considerable quantity was sent in boats down the river Ganges; in the year ending March 31st, 1877, 35,975 maunds were thus despatched from the city of Cawnpore.

Wheat.—Wheat is noticed separately from the other kinds of grain produced in these provinces, because it is the only kind in which there is a large export trade to Europe. The following is an account of the history of the wheat trade and its prospects for the future, kindly furnished by Messrs. Reinhold Brothers, of Agra, at the request of the Department of Agriculture and Commerce:—

“Shipments of wheat from India to Europe have been made for a number of years from the ports of Bombay and Kurrachee, where the surrounding wheat-growing districts offered particular facilities added to a superior quality of grain and often less charges in bringing the stuffs to those ports.

“The extension of the wheat trade which refers to the North-Western Provinces and the Panjab, and has Calcutta as its shipping port, dates from the season 1875-76.

“The home market at the time did not show any peculiarity in favour of this trade, and it was only the unusually cheap price of wheat in these provinces which attracted attention to this branch of trade. Four or five good seasons had accumulated large stocks in all markets and districts, and the prices of wheat fell in markets like Cawnpore and Agra to 30 or more seers per rupee (taking as standard quality what is known in trade as Etawáh wheat, or, as a Calcutta mark, Mountain Club No. 2).

“The East Indian Railway Company made liberal concessions in conveying the grain, and so up-country merchants were actually able to offer their shipments in the Calcutta market at Rs. 2 to Rs. 2.2.0 per bazar maund ready bagged and packed for Howrah station.

“It was further facilitated by an exceptionally low exchange (about 1s. 6d.). The ship freight was at its normal rate during the season.

“The abolition of the wheat duty must have favoured the trade to the extent of its value, as any reductions or diminution of charges produce more chances for successful competition.

“The following (1876-77) season was again an exceptionally good wheat season for the Upper Provinces, with still a good surplus stock of former years, and the trade received a new impulse by the political aspect in the east of Europe. The blockade of the Black Sea caused considerable speculation and rise of prices in the English market, and now it became the demand of the home market which fostered and influenced the wheat trade in this country, and prices rose in the Calcutta market to Rs. 5 per maund. This rate could at the time not compete profitably in the English market, but was locally caused by the block on the railway; and as merchants had their shipping previously engaged, they had often to fill their vessels at heavy losses. This period has had another effect on the trade which is often overlooked, but in our opinion affects the business seriously. As said before, owing to the railway block, Calcutta merchants were often obliged to buy *pêlé mèle*, of which native merchants took advantage by a careless and sometimes fraudulent system of packing, which ultimately led to no end of complications and vexations on the Commercial Exchange at home amongst all concerned, as consignors, consignees, brokers, and millers. The consequence of all was that Indian wheat must be offered comparatively much cheaper, on this account alone, to compete with American and continental grain. A check on the export trade of wheat commenced in the month of August 1877, when, with the failure of the rains, people became aware of the likelihood of a scarcity. The rate rose in a few days sufficiently to put a stop to further despatches to the Calcutta market, and by the end of last and the beginning

of this year (1878) it was found that the stocks of wheat in the North-Western Provinces were pretty fairly exhausted, which was made very clear by the importation of grain into districts which were looked upon as the best wheat producers and feeders to the various marts. At this time the Panjab stepped in with supplies for the local demand, and was able to pass off its inferior and old grain, which had been found unfit for exportation to Europe.

“The prospect of the wheat crop of 1877-78 looked pretty favourable until marred by the cold winds of the month of March. In most districts the grain was not sufficiently developed, and consequently light and inferior.

“The scarcity in the North-Western Provinces kept the rates in the various bazars equal, and often above Calcutta market or export prices, or, putting it into figures, say about one rupee per maund too high for export.

“If it had not been for the exhaustion of stocks in the North-Western Provinces the past season would have been very favourable for exports, as the English market kept exceedingly high, and the large amount of shipping in Calcutta reduced the freights to the ruinous rates of less than 10s. per ton.

“We consider the exports of the last harvest from the upper provinces to the Calcutta market insignificant, because at no time Calcutta orders could be worked profitably from any of our principal markets. However, some despatches were made, mostly by speculators who had in the beginning of the year contracted forward sales, and of course became losers in these transactions.

“We are further of opinion that a good deal of the last wheat crop has been kept in private hands in the districts, and will help to collect gradually again a surplus stock.

“A wheat trade with Europe can only be beneficial to this country as long as the surplus stocks realise better prices than they otherwise would by bringing the money to the country. Thus only does a good plentiful harvest mean more riches to the ryots, which has not always been the case.

“The Indian wheat trade will in future be based on either—

1. High prices in Europe or failure of crops in America.
2. Exceptionally good crops in India.
3. Low ship freight.
4. Low exchange.

“All of which may be caused by many and various causes, which it would lead too far to elucidate here.

“The increase of the export trade during the famine in Madras, we believe our general resumé will show, rested on the large surplus stock in the upper provinces, as the Madras Presidency was less a purchaser of wheat than of coarser sorts of grain.

“The principal cause of the check to the wheat trade was the rise of prices in this country.

“In conclusion we beg to say that if the markets in the North-Western Provinces have got over the effects of the late scarcity, we consider in ordinary good seasons the normal rate of wheat to be about 18 to 20 seers for one rupee, taking Agra as the centre, at which rate the European market would require already exceptional fluctuations to be able to compete.”

It will be seen from this account that it was not till the year 1875 that wheat was exported from Calcutta in any very large quantities, and from that year to the year 1877, each year shows a decided increase. The failure of the June rains in 1877 gave the trade a decided check, which has since continued through a period of unusually high prices.

The parts of these provinces in which there is most wheat cultivation are the divisions of Meerut and Rohilkhand and the districts in Oudh which border on the Gogra. The subjoined statement shows the amount which was exported to Calcutta in the year ending September 30th, 1878, from each block, but it must be remembered that a great deal of wheat is not

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consigned to Calcutta direct from its place of production, but is first collected in intermediate marts, whence the Calcutta consignments are made. The chief of these marts are Cawnpore, Agra, and Delhi; the first for the districts of the Lower Doab, Bundelkhand, and Oudh; Agra for the districts of the Middle Doab; and Delhi for the districts of the Meerut division. Since Delhi is not the centre of these provinces, exports from it are not included, and therefore a portion of the wheat actually exported from these provinces does not figure in the returns.

From Stations within limits of the				From Stations on the		Total.
Meerut Division.	Agra Division.	Allahabad Division.	Benares Division.	Oudh and Rohilkhand Railway.	Muttra-Hathras Railway.	
76,088	82,485	327,324	12,214	2,33,510	255	729,055

The year for which these figures are given was one which commenced with the failure of rain which was noticed above as giving a serious check to the trade; and throughout the year prices have been so high as to scarcely admit of exporting at a profit. The extent to which the trade fell off may be seen from the returns of wheat sent by road into Delhi from the Meerut division in the months of April, May, and June 1877, that is, before the failure of rain could be anticipated. This amounted to 637,257 maunds, very nearly the whole of which must have been for export to Calcutta.

In the year ending September 30th, 1878, a considerable amount of wheat was sent from these provinces to Bombay. The railway returns are summarised below. It must be remembered, however, that the wheat which is sent to Bombay was not destined for export to Europe, or to supply the abnormal demand occasioned by the famines in Bombay and Madras.

From Stations within limits of the				From Stations on the		Total.
Meerut Division.	Agra Division.	Allahabad Division.	Benares Division.	Oudh and Rohilkhand Railway.	Muttra-Hathras Railway.	
13,026	8,370	56,203	583	59,432	—	112,778

MOVEMENT OF GRAIN by Rail within the Provinces.

	Imports to each block within the provinces from all other blocks within the provinces.						Exports from each block within the provinces to all other blocks within the provinces.					
	To Meerut.	To Agra.	To Allahabad.	To Benares.	To Rohilkhand.	To Oudh.	From Meerut.	From Agra.	From Allahabad.	From Benares.	From Rohilkhand.	From Oudh.
Total of 1st quarter.	Mds. 32,085	Mds. 311,136	Mds. 58,945	Mds. 3,049	Mds. 354,670	Mds. 139,257	Mds. 10,876	Mds. 438,326	Mds. 165,698	Mds. 5,729	Mds. 8,658	Mds. 29,703
" 2nd "	11,155	84,331	34,187	6,797	172,820	18,486	217,440	5,575	60,685	31,256	4,162	8,658
" 3rd "	26,322	345,872	123,964	123,240	2,913	2,464	88,149	20,789	35,456	3,245	393,427	73,818
" 4th "	7,294	41,335	526,362	45,797	3,870	3,048	43,309	89,979	25,775	7,545	431,395	29,703
Total	76,856	782,674	743,459	178,092	534,273	23,998	488,155	127,219	560,242	207,744	834,713	112,179

Wheat was exported to Bombay in company with grain of other different kinds, and there is no reason why it should be noticed separately from them, since its export was influenced by the same conditions, and is not due to the European demand, as was the export trade to Calcutta.

Edible Grains other than Wheat.—The chief of these are gram (*cicer arictinum*), rice, and the autumn millets (*holcus sorghum* and *penicillaria spicata*); but there are numerous other kinds, each of which does not of itself deserve separate notice. These different kinds are not grown in the same proportion throughout the provinces; but as might be expected, different conditions in soil, climate, and water-supply make themselves seen very plainly in localising to some extent the different kinds of crops. This is especially evident with rice, which is most grown in the districts of the sub-Himalayan and penultimate belts. Thus the per-centage of rice area to total cultivated area is in Saharanpur, 15·9; Bareilly, 27·8; Gonda, 50·1; and Gorakhpur, 38·5; while in Meerut it is only 2·2, in Aligarh 6, in Cawnpore 2·7, and Banda 3·6.

The portion of the cultivated area in these provinces which bears a crop in both autumn and spring is comparatively small, and by far the larger part bears only one crop within the year, which may be (roughly speaking) either sown in June and reaped in October, or sown in October and reaped in April. Examples of the former class of crop are rice and the various millets (joar, bajra, &c.); examples of the latter are wheat, barley, and gram. Whether the crop on any field is to be an autumn or spring one is determined partly by custom, which in some cases favours the alternation of autumn and spring crops, and partly by the conditions of the land as to water-supply, &c. Should the means of irrigation be scanty, or nil, other things being equal, an autumn crop would be grown, since this, gaining its water from the rains, is to a great extent independent of artificial irrigation. On the other hand, a spring crop is preferred for land which can be easily and effectually irrigated in case of the winter rain failing, as very frequently happens. From there being two harvests within the year it follows that the grain trade varies in different periods of the year not only in the kind of grain dealt in, but also in the direction in which it runs.

Causes affecting the conditions of the crops are often very local in their action, and so it is not uncommon to see a stream of export trade in autumn grain not only checked but turned by mere anticipation of a failure of the spring harvest.

A statement is appended showing the movements of grain by rail between the different blocks in these provinces during the year ending September 30th, 1878, as well as between these provinces and places outside their limits with which trade is transacted.

MOVEMENT OF GRAIN by Rail from and to the North-Western Provinces.

	Total Railway Imports of Grain into the North-Western Provinces.								
	From Calcutta.	From Bengal.	From Behar.	From Panjab.	From Rajputana.	From Central Provinces.	From Bombay Presidency.	From Bombay Town.	Total Imports.
Total of 1st quarter	Mds. 40,718	Mds. 172,042	Mds. 1,834,629	Mds. 869,045	Mds. 43	Mds. 631,306	Mds. 158,341	Mds. 711	Mds. 3,706,835
" 2nd "	140,483	541,033	1,314,658	1,680,646	259	285,680	47,095	2,313	4,013,167
" 3rd "	11,583	61,233	120,988	45,691	652	3,282	43	285	243,707
" 4th "	1,210	17,315	46,490	43,754	3,231	4,117	303	92	116,494
Total	193,994	791,623	3,316,715	2,639,136	4,185	924,385	205,782	3,401	8,080,203

	Total Railway Exports of Grain from the North-Western Provinces.								
	To Calcutta.	To Bengal.	To Behar.	To Panjab.	To Rajputana.	To Central Provinces.	To Bombay Port.	To Bombay City.	Total Exports.
Total of 1st quarter	Mds. 4,706	Mds. 106	Mds. 949	Mds. 8,530	Mds. 20,192	Mds. 5,702	Mds. 184,494	Mds. 28,414	Mds. 253,093
" 2nd "	6,672	418	1,501	35,389	18,926	4,294	33,890	63,224	164,314
" 3rd "	603,566	5,547	10,468	32,547	276,481	58,158	207,118	227,861	1,421,746
" 4th "	155,988	1,081	40,230	6,742	10,300	53,287	51,620	66,414	385,663
Total	770,932	7,152	53,148	83,208	325,899	1,21,441	477,122	385,913	2,224,816

To understand the significance of the figures it must be remembered that the agricultural condition of the different quarters of the year was as follows:—

First quarter, October 1st, 1877, to December 31st, 1877.—There had been an almost complete failure of the autumn rains, and the autumn crop was consequently in great measure lost. The condition of the Rohilkhand and Agra divisions was specially bad and famine relief works were started first within their limits. Though, so far as the autumn rains went, the Meerut division was equally badly off, yet better means of irrigation saved a portion of the crop and a series of good harvests had filled the granaries. Great apprehensions had been entertained concerning the spring harvest for which rain was absolutely necessary, but a timely fall in October allowed of ploughing and sowing, while more rain in November gave hopes of a good spring harvest.

Second quarter, January 1st to March 31st, 1878.—Periodical falls of rain continued and made the prospect of a good spring harvest appear more and more hopeful. The area under spring crops was far larger than usual, since a great deal of the portion usually allotted to autumn crops was sown.

Third quarter, April 1st to June 30th, 1878.—The spring harvest when gathered in fell far below expectations, except perhaps in Rohilkhand. The failure of the autumn rains had considerably lowered the water level and the ground was far drier beneath the surface than is usually the case. From this the crops were stunted and weakly and ill able to resist the rust and blight which attacked them.

Fourth quarter, July 1st to September 30th, 1878.—At the commencement of this quarter it was feared that there was going to be a second failure of the rains. But all apprehension was relieved by a fall in August and September, which, though late, gave a fair average autumn crop.

The statistics of railway trade in grain which passed between the different blocks of the provinces show that in the first quarter of the year the Rohilkhand and Agra blocks imported very largely, while the Meerut, Allahabad, and Benares exported. In the second quarter there was a marked decrease in the imports, and the Meerut block alone was able to export to any considerable extent, while Rohilkhand still continued the chief importer. The third quarter is characterised by a large export from Rohilkhand,

nearly all of which was taken by Agra. A good spring harvest had enabled Rohilkhand to recover its losses by the sale of its surplus. Between the other blocks trade decreased considerably. The chief feature in the fourth quarter was the export of grain to the Allahabad block. Rohilkhand was still the largest exporter, but Agra had sufficiently recovered itself to begin exporting. The import of grain by the Allahabad block was not to supply its own consumption, but merely indicates the collection of grain at Cawnpore for export to the ports of Calcutta and Bombay.

The statistics of grain trade between the provinces as a whole, and places external to them, exhibits variations of the same kind. The first and second quarters were characterised by enormous imports chiefly from Behar and the Panjab. In the third quarter exporting began chiefly to Calcutta, and this continued, but in a less degree, during the fourth quarter. A judgment may be formed from the figures of the first statement as to the proportions in which the imports were distributed between the different blocks of the provinces, or in which they contributed to the exports.

Iron (including Hardware).—Iron ore is indigenous in the hill districts of these provinces, and iron has always been produced from it by the rough processes of smelting known to the hillmen. Some years ago iron works were started by Government near Rāmnagar, but from scarcity of fuel and difficulty of carriage as well as from inexperienced management they have not as yet been a financial success. The amount imported from the hill districts to the plains is not very considerable, only amounting to 1,799 maunds in 1877–78. Native iron is also imported from Nepal, but not to any great amount, the gross import in 1877–78 being 3,156 maunds. Iron occurs also in the range of hills which skirt these provinces to the southward in the territory of the native states of Gwalior, Bundelkhand, and Rewah. This is the source from which nearly all the country iron used in these provinces is drawn. In 1877–78 the imports from Gwalior amounted to 11,383 maunds, and from Bundelkhand 148,601 maunds. But throughout the provinces European imported iron and steel is gradually ousting the country article, being considered superior to it in quality and cheaper in price. No inconsiderable amount of European iron is imported even to those places in which country iron is indigenous. Thus in

1877-78 3,800 maunds were sent to the state of Gwalior, and 7,406 maunds to the hill districts of Dehra Dún, Garhwál, and Kumaun.

The imports of European iron and hardware reach these provinces principally via Calcutta, though Bombay takes a larger share in this trade than in cotton goods. During the year ending September 30th, 1878, 457,473 maunds were imported from Calcutta and 61,190 from Bombay.

The latter consisted chiefly of railway iron and was consigned to the Agra block, being destined for the Rajputana and Gwalior state railways. Probably for the same reason the Agra block took the largest share of the Calcutta iron (197,098 maunds). The Allahabad block took 135,076 maunds, most of which was consigned to Cawnpore, which is the chief entrepôt for iron as for cotton goods. It has been noted above that by far the largest imports of country iron are from the Bundelkhand state of Chatarpur, &c. Nearly the whole of this which is not consumed in the trans-Jumna districts finds its way to Cawnpore.

In the year 1876-77, Cawnpore received 42,777 maunds of iron from Bundelkhand and 60,766 maunds from up-country. A great part of this latter must have been from Gwalior. Nearly the whole of this must have been sent into Oudh, which received from Cawnpore in the same year 36,186 maunds by road, and 24,431 maunds by rail. Iron consigned from Calcutta to Agra and Meerut, as well as that received from Gwalior, is passed on to the districts of Rohilkhand and Oudh; in 1877-78 the amount which crossed the Ganges by road into Rohilkhand was 9,717 maunds and into Oudh 9,567 maunds, the latter exclusive of consignments from Cawnpore.

Opium.—The opium produced in these provinces is all extracted from poppy cultivated on account of Government. Its cultivation is only permitted in certain districts in which special arrangements are made with the cultivators by the officers of the opium department. The cultivators are permitted to grow the poppy on certain areas of their holdings and are assisted by money advances on condition that they give up the whole of the produce at a certain fixed price. The opium thus obtained is forwarded to the Government factory at Gházipur, where it is purified and made up into oblong cakes if for consumption in this country, and into round balls if for export to China. The districts in which the cultivation of the poppy is permitted are three in Rohilkhand (Bareilly, Budaun, and Sháhjánpur), the Doáb districts from Etáwah and Mainpuri downwards, and all the districts in Oudh and the Benares division.

In the year ending September 30, 1878, the consignments of raw opium by rail to Gházipur amounted to 5,232 maunds from the Agra block and 15,545 from the Allahabad block. The amount consigned from stations on the Oudh and Rohilkhand Railway is not known. In the same year 129,754 maunds were exported by rail from Benares to Calcutta.

Salt.—The manufacture of salt is not permitted in these provinces, although brackish earth is of common occurrence, from which the extraction of an impure quality of salt was formerly a considerable industry. Salt is now obtained from four sources (i.) Thibet, (ii.) the Upper Panjab, (iii.) Gurgaon and Rajputana, (iv.) Calcutta.

(1.) **Thibet salt.**—Salt is brought from Thibet across the snow passes laden on the backs of sheep. It is fairly pure, containing some 93 per cent. of chloride of sodium (Inland Customs report, 1867-68, note 10), and is vastly preferred by the natives of Kumaun and Garhwál and by the Nepalese to any kind of salt which can be imported from the plains. It is said to have more piquancy of taste and to be more wholesome than either Lahori, Rajputana, or Calcutta salt, and it is only the former of these three kinds which competes with it in the hills, and that to no very great extent. On the other hand the consumption of Thibet salt is confined to the hills, and little or none ever reaches the plains. In 1877-78 the imports of salt from Thibet into the hill districts amounted to 31,709 maunds. During that year

traffic between the hill districts and the plains was not registered, so it cannot be said whether any of this Thibet salt passed on beyond the hill districts. We have, however, statistics for 1876-77 which show that during that year only 101 maunds of salt passed from the hills to the plains. According to our present information Thibet salt would appear to be gradually giving way before that from the plains; the amount of this latter exported to Nepal in 1877-78 being some 13,000 maunds in excess of the exports in the previous year.

Thibet salt is the only variety which comes into those provinces untaxed. The advisability of taxing it has been fully discussed, and it has been decided that the advantages of taxing it would be incommensurate with the difficulty and expense of enforcing the duty, and the distress which would be caused to the numbers who now make a livelihood from the trade.

Salt is imported from the salt mines of the Upper Panjab (Pind Dádan Khan, &c.), and in the plains is more generally preferred than all other imported varieties. Unfortunately Lahori salt has not been distinguished from other kinds in the registration returns, so that the amount annually imported cannot be estimated with accuracy.

In *Rajputana salt* is included that from salt pans and marshes in the Gurgaon district of the Panjab, as well as that produced in Rajputana itself. There are several varieties: the most important are *Sambhar* salt from the lake of that name in the Jaipur territory, *Balambha* from the state of Bhartpur, *Dindwana* and *Pachhadra* from salt marshes in the Jodhpur state, and *Sultanpur* and *Salambha* from different parts of the Gurgaon district. All these varieties are obtained by evaporation, caused either naturally, as on the edge of lakes or marshes (Sambhar and Dindwana), or artificially by exposure in pans (Balambha, Sultanpuri, and Salambha). Now that treaties have been effected with those states of Rajputana in whose territory salt was produced, the places from which salt is imported are limited to the Upper Panjab, two places in Gurgaon, the Sambhar lake, and three other lakes in Jodhpur territory. By far the most important variety is the Sambhar, which is supplanting all other varieties in the consumption of the provinces, its import being facilitated and cheapened by a light line of railway running to the place of its production. The amount of this salt actually purchased during the past year was about 2,700,000 maunds, and it is probable that during the present year sales will reach a still higher figure. The light railway is hardly adequate for the carriage of the rapidly increasing trade. Agra and Delhi are the two centres of the salt trade. Through the former comes Sambhar salt, while the latter takes all the Gurgaon salt (Sultanpuri and Salambha), as well as some of the other varieties (Dindwana, &c.). In the year 1877-78 the imports by road from Delhi amounted to 452,676 maunds, 109,169 maunds of which subsequently crossed the Ganges into Rohilkhand. The road imports from Rajputana to Agra in the same year came to 100,565 maunds.

We have already seen that the province of Rohilkhand draws most of its salt from Delhi. Oudh, on the other hand, is chiefly supplied from Cawnpore, to which Sambhar salt is carried from Agra in large quantities. In 1876-77, 141,093 maunds of salt were sent from Cawnpore into Oudh by road alone, while in the same year the total amount which crossed the Ganges between the Doáb and Oudh only came to 177,892 maunds. To this must be added the amount consigned by rail, both from Agra and from the Rajputana State Railway via Agra.

Cawnpore is also a salt distributing mart for the trans-Jumna districts of Bundelkhand. In 1876-77 63,390 maunds were despatched by road from Cawnpore towards Bundelkhand.

European salt imported via Calcutta does not come much further up country than Benares, at which place its cost is about that of the Rajputana article. During the year ending 30th September, 1878,

60,000 maunds reached these provinces from Calcutta, of which 55,000 maunds were taken by the Benares block. From the East Indian Railway trade report for the half year ending 30th June, 1877 it appeared that in the six months, taking the whole length of the line, the amount of salt carried up country from Calcutta was about the same as that carried downwards from the Panjab, Delhi, and Agra, each amounting to some ten lakhs of maunds. It appears then that these provinces take but a small amount of the Calcutta article, which will be still more diminished by any fall in price of Rajputana salt, whether owing to reduction of duty or cheapening of carriage.

Oil-seeds.—Under this head are included various kinds of seeds from which oil is extracted, the chief of which are linseed, mustard, rape, and til (or gingelly). These are grown all over the provinces, but, except in the sub-Himalayan and penultimate belts and the tract of Bundelkhand, they are as a rule not grown alone, but sown as a subordinate crop in the corn fields either along the edges as a border or in parallel lines across it, or broadcast. It is probable that in almost all parts of the provinces the quantity of oil-seeds produced is sufficient for local wants, if not for exportation, though it is chiefly from the two localities named above that there is a considerable surplus for export. The districts which export by far the largest quantity are those of Kheri, Bahraich, and Gonda, in the province of Oudh.

In the year ending March 31st, 1878 the net exports by road from Rohilkhand to the Doab were 98,017 maunds. In the preceding year the city of Cawnpore received by road 144,487 maunds from Oudh and 424,067 maunds from Bundelkhand. Mustard and rape were the most important items in the imports from Oudh and Rohilkhand, while of the various kinds which come from Bundelkhand linseed figures largest. Oil-seeds are collected in Cawnpore, not to supply local consumption, but for export to Calcutta, and it is as one of the most important of the exports to the ports, and not as an article of internal trade, that oil-seeds are chiefly remarkable.

The subjoined tables show the exports by rail to Calcutta and Bombay from each of the North-Western Provinces and Oudh blocks, in the year ending Sept. 30, 1878:—

Exports to Calcutta from blocks—

Description.	Meerut.	Agra.	Allahabad.	Benares.	Oudh, Rohilkhand Railway.	Total.
Linseed	252	1,990	426,077	10,813	63,661	502,793
Mustard and rape.	27,343	126,805	783,699	37,333	37,477	1,012,857
Til	—	253	5,195	9,361	—	14,809
Other kinds.	—	16,436	143,424	11,906	9,471	181,237
Total	27,795	145,484	1,358,395	60,413	110,609	1,711,696

Exports to Bombay from blocks—

Description.	Meerut.	Agra.	Allahabad.	Benares.	Oudh, Rohilkhand Railway.	Total.
Linseed	—	—	81,732	1,840	71,269	1,24,541
Mustard and rape.	5,502	53,785	412,338	497	34,998	5,07,120
Til	—	—	112	—	—	112
Other kinds.	5	—	827	—	896	1,739
Total	5,507	53,785	495,009	2,337	107,163	633,501

The Allahabad block is out of all comparison the largest exporter, and most of the oil-seeds registered as leaving it were despatched from the city of Cawnpore, which is the chief collecting mart for them in Upper India.

A very considerable amount is sent down the Gogra from the Oudh districts of Bahraich and Gonda. This is most of it primarily consigned to Patna, whence it is despatched to Calcutta by rail. In the year ending March 31st, 1878, the oil-seeds exported down the Gogra amounted to 2,453,682 maunds, of which over 1,400,000 maunds consisted of linseed. The amount sent down the Ganges is thus over one-third more than that consigned by rail to Calcutta from all the blocks in the provinces.

Stone.—Stone is only found in the hilly districts at the upper and lower boundaries of the provinces. In the ordinary districts of the plains it does not occur, and its use in them is limited to the small hand-mills used for grinding corn and (in the eastern districts) to kolhus or sugar-mills. The towns which are noted for their stone-built streets are those which are situated near stone quarries, e.g., Muttra and Háthras, from which the quarries in the Agra district are only distant 30 or 40 miles.

The use of stone being so limited in all places but those of its production, the trade in it is of but secondary importance. Gwalior, Bhartpur, and the Agra districts are the places from which most appears to be imported, coming as in slabs or hand-mill stones. The former are used for building purposes, and do not, as a rule, travel far; the latter are distributed over the whole of the Meerut, Rohilkhand, and Allahabad divisions.

In the year ending March 31st, 1878, 205,902 maunds of stone were imported by road from the native states of Gwalior, Rajputana, and from the trans-Jumna portion of the Agra district. Agra is the chief stone mart in the provinces, and it re-exports the stone it receives by road and by rail.

By road the stone passes up via Háthras towards Rohilkhand, which in the year ending March 31st, 1878, received 5,851 maunds. A considerable portion is embarked on the Ganges Canal in the Aligarh district, and sent down to Cawnpore, which in the year ending March 31st, 1877, received 5,949 maunds in this way. Cawnpore distributes the stone to Oudh on one side and Bundelkhand on the other.

A considerable quantity of stone is despatched from Agra to Muttra and Delhi, part of which is despatched by the Agra canal, and part by road. In the year ending March 31st, 1878, Delhi received by road 26,851 maunds, 1,752 maunds of which she re-exported by road to Meerut.

The subjoined statement shows the exports of stone from the Agra block to each other North-Western Provinces and Oudh block during the half-year ending March 31st, 1878:—

From Agra block to block—

Meerut.	Allahabad.	Benares.	Oudh and Rohilkhand Railway.	Muttra and Háthras Railway.
24,099	20,101	3,239	17,062	—

Sugar.—The natural area for the cultivation of the sugar-cane in these provinces would appear to be the sub-Himalayan and penultimate belts, in the former of which it is frequently grown without irrigation, while in the latter it is, as a rule, irrigated, except in exceptionally situated tracts, such as the alluvial beds of rivers, &c. But to this area must now be added a great portion of the districts irrigated by the Ganges canal, in which facilities for obtaining an abundant supply of water are gradually extending sugar-cane cultivation over tracts which formerly were strangers to it. The per-centage of sugar-cane area to the total cultivated area ranges in the Rohilkhand districts from 8 in Bijnor to 2·7 in Budaun, in the trans-Gogra districts of Oudh and the Benares Division from 3·2 in Gorakhpur to 1·5 in Gonda, and in the cis-Gogra districts of Oudh, within the limits of the penultimate

CHAP. I. QN. 17. belt, from 5.5 in Fyzabad to 3.9 in Sitapur. There is also extensive sugar-cane cultivation in the Azamgarh and Jaunpur districts.

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South of the penultimate belt, sugar-cane cultivation seems limited to some districts in which there is canal irrigation, and occurs to any considerable extent in only a few of these. Thus the per-centage is in Unao 1.4 and in Agra .6, while in Meerut and Etah (both canal-irrigated districts) it is 6.4 and 2 respectively. In both of these latter districts a considerable amount of cane is grown on the old alluvial bed of the Ganges, which is not irrigated from the canal. Districts which depend for their cane cultivation on the canal alone do not show such high per-centages.

Speaking generally, it may be said that the portions of the provinces where sugar production gives a surplus over consumption are the Meerut, Rohilkhand, and Benares divisions, and the province of Oudh; while the trans-Jamna tract from Agra to Banda imports largely, and the districts of the middle and lower Doab to a less extent.

In the year ending March 31st, 1878, 446,162 maunds of sugar crossed the Ganges from Rohilkhand and the Doab by road alone, and in the preceding year 337,873 maunds crossed from Oudh into the Doab. In this latter year 1,27,498 maunds were sent by road towards Bundelkhand from the city of Cawnpore.

The subjoined statistics show the railway trade in sugar during the year ending September 30th, 1878, between each of the different blocks in the provinces to each other block in the provinces:—

EXPORTS of Sugar by Rail from each of the Blocks in these Provinces to the other Blocks in the Provinces.

From Blocks—

Meerut.	Agra.	Allahabad.	Benares.	Oudh and Rohilkhand Railway.
50,392	1,875	26,470	76,695	152,011

IMPORTS of Sugar by Rail to each of the North-Western Provinces and Oudh Blocks from the other Blocks in the Provinces.

To Blocks—

Meerut.	Agra.	Allahabad.	Benares.	Oudh and Rohilkhand Railway.
64,602	174,251	46,171	242	26,526

It will be noticed that taking merely internal trade into consideration, the Benares and Oudh and Rohilkhand railway blocks are the largest exporters, while the Agra block is by far the largest importer of sugar. The export trade in sugar to the ports is not considerable in amount. The trade with all the other tracts adjoining those provinces is one of export, with the exception of the province of Behar, in Lower Bengal, from which sugar is imported in considerable quantities.

Sugar is largely exported to the Panjab by road and rail. By road the net exports in the year ending March 31st, 1878, amounted to 437,238 maunds, while the net exports by rail in the year ending September 30th, 1878, were 126,525 maunds, the largest exporting blocks being the Oudh and Rohilkhand Railway and the Benares division. Rajputana also takes a good deal of sugar, the net exports by road being 140,702 maunds in the year ending March 31st, 1878, and by rail 206,919 maunds in the year ending September 30th, 1878, the principal exporting blocks being the Allahabad and the Oudh and Rohilkhand Railway.

The export trade with the Central Provinces and the states of Bundelkhand is not considerable enough to deserve separate notice.

The net imports from the provinces of Behar by road only just balance the exports, while the exports by the river Gogra are enormously in excess of the imports, amounting in the year ending March 31st, 1878, to 619,959 maunds. The districts in these provinces immediately adjoining Behar are all large sugar producers, and the local trade between them and the Bengal provinces is much in their favour. The sugar exported by the Gogra must have been destined for places beyond Behar itself. The imports from Behar by rail in the year ending September 30th, 1878, amounted to 261,774 maunds, the major portion of which was taken by the Agra division.

Sugar is not so well or carefully cultivated in the North-Western Provinces as in many other parts of the world, and its manufacture is conducted by very rude processes. The attention of this Department has been turned to the improvement both of the cultivating and manufacturing systems; and new processes, either recommended by European planters, who are personally engaged in the production of sugar, or specified in the treatises on the industry in other countries, have become the subject of experiment. Endeavours are also being made to procure new plants from outside India. Should material improvement be possible, there is no reason why these provinces should not compete in better markets.

Timber.—The only portions of the North-Western Provinces which do not seem to produce sufficient timber for the ordinary domestic and manufacturing purposes are the districts of the Meerut and Agra divisions, many of which in their conspicuous treelessness resemble the neighbouring tracts of the Panjab and Rajputana. It is in these two divisions that the greater part of the timber trade seems to centre which is destined for the supply of provincial requirements. By rail the only large importer is the Agra block, which in the year ending September 30th, 1878, imported 57,032 maunds net; but this was not entirely to supply local consumption, for some portion of the timber, though consigned to Agra, was merely collected there for despatch to Rajputana. Delhi is another centre for the timber trade, and shares with Agra a transit traffic in timber between the more thickly-wooded parts of these provinces and the treeless plains of Rajputana and the Panjab.

Although, as stated above, most districts in these provinces produce enough timber for ordinary purposes, yet the only tract from which there is much timber exported is that which has been designated the sub-Himalayan, to which may be added the southern portions of the Bundelkhand districts.

But by far the larger portion of the timber which crosses the provinces comes from the country of Nepal, entering our territory both by road and river. In the year ending March 31st, 1878, the imports of timber from the Nepal forests amounted to 591,892 maunds.

From the sub-Himalayan region, therefore, whether in our territory or in that of Nepal, most of the timber is despatched which figures in the trade of these provinces. The course of the trade is, roughly speaking, at right angles to the line of the principal rivers; and in consequence, though conveyance by water is peculiarly suitable for timber, it is only in the first half of its journey that rivers are much used for transporting it.

On first leaving the place of its production the timber is generally made up into rafts and floated down the streams which flow towards the Ganges or Gogra. On both these latter rivers there are large timber wharves, at which these rafts are unloaded. The chief wharves on the Ganges are Garhmukhtesar, in the Meerut, and Anupshahr, in the Bulandshahr districts. Timber is floated down in the rains to these places from the Bijnor jungles, and from them is despatched by road to Meerut, Delhi, or Agra. A considerable quantity is also consigned to these three towns by road direct from the forest it is cut in. Thus, in

the year ending March 31st, 1878, 149,216 maunds of timber and 317,810 maunds of bamboos crossed the Ganges from Rohilkhand into the Doab, coming in carts from the Bijnor and Tarai forests. As noticed in the answer to question 20, the dam of the Ganges Canal at Narora prevents rafts from Bijnor going down the Ganges below that point, and thus all the timber from Bijnor is concentrated at the Garhmukhtesar and Anupshahr wharves. Below Narora the Ganges receives timber from the Ramganga and Garra rivers, on which it is floated down from the Tarai above Bareilly. Part of this goes to the Farukhabad wharf and part to that at Cawnpore.

The chief wharves on the Gogra are those of Khairi and Bahramghat; the latter is by far the most important, and is the great timber entrepôt for the Nepal forests, which lie on or near the Gogra. From Bahramghat the timber crosses into the Doab by either road or rail; by rail 41,422 maunds were exported from the Oudh and Rohilkhand railway block (in which Bahramghat is situated) during the year ending September 30th, 1878.

Subordinate Articles of Trade.—The most important of the other commodities which figure in the trade of these provinces are hides, ghi, tea, and tobacco.

Hides are exported to Calcutta in considerable quantities from the towns of Delhi and Cawnpore.

Ghi (clarified butter) is another export to the ports, consigned chiefly from those parts of the provinces where there is much waste ground for the grazing of the cattle from whose milk the ghi is made. Thus it happens that the little town of Jaswantnagar, in the Etawah district, exports a considerable quantity of ghi each year, being situated near a large tract of raviny ground on the Jumna bank, well suited for cattle grazing.

Tea is grown both in Kumaun and Dehra Dún, but its cultivation would appear to have almost reached its maximum. The annual exports from Kumaun are estimated at about 500,000 lbs., of which some 300,000 lbs. are purchased by Kabuli merchants, and taken by them to Bokhara and other parts of Central Asia.

Tobacco is grown in almost every part of the provinces, but chiefly in those districts where the climate is damp and soil moist. It is, with pán, the chief luxury of Indian consumption, and is either smoked or chewed by almost every native in the country. The best qualities grown in the provinces are from Rohilkhand and Oudh, which exported to the Doab by road in the year ending March 31st, 1878, 9,825 maunds and 31,897 maunds respectively. A tobacco farm has been lately started at Ghazipur and Poosa (in Bengal) by a Calcutta firm, under the management of an American curer, and there is good reason for expecting that a cured leaf will be produced which will command a ready sale in the European market.

The broad characteristics of the trade of the North-Western Provinces and Oudh have now been noticed from the aspect of the chief commodities in which this trade consists, and it seems unnecessary here to go again over the same ground from another point of view, re-classifying the trade according to the different streams in which it runs, and the different states or provinces affected by it. Reference may be made for this to the trade report for the year ending March 31st, 1878, in which this latter was the mode of classification primarily followed.

As has been stated before, although statistics of road and river traffic are available for the whole of the year 1877-78, yet the railway statistics which have up to date been collated are only for six months of this year. If to these figures could be added the railway returns for the first six months of the current year (1878-79), we should have railway figures for a complete year, but although this could be done in the case of a few particular commodities, it has been found impossible with the trade as a whole. But even if the railway statistics were completed in this manner little more than a rough guess could be hazarded as

to the total trade of the year they concern, since the road and river returns would be for different years coinciding in period for six months only.

Trade in these provinces consists almost so entirely of traffic in country produce that a history of the movement of produce from the field to its eventual destination will comprise a description of the classes engaged in conducting the movements of trade.

To begin with the cultivator. He has three ways of disposing of his surplus out-turn. Firstly, he may take it to the nearest mart, and dispose of it himself, which he does by applying to a "weighman" (and as a rule he generally contracts a habit of going to the same "weighman" year after year), who finds out for him a purchaser and helps to arrange a price, receiving in return a commission or weighment fees.

Or, secondly, he may dispose of it by arrangement at his village to one of the petty traders or produce collectors, termed *baiparis*, who travel about the country for the purpose of collecting produce. Very often the *baipari* confines his operations to the same set of villages year after year, and makes advances to cultivators, with whom mutual credit has been established for delivery of grain. As a rule, cultivators carry in on their own carts the produce which the *baipari* purchases for the central mart.

The *baipari* purchasers are supplemented by special agent, occasionally sent out by central firms for special purchase.

Or, thirdly, the cultivators dispose of their produce to a local collecting merchant, who is sometimes a merchant pure and simple, sometimes the village banker, who, in his operations with the cultivating classes advances from time to time money, food, or grain, to be repaid at harvest, sometimes a wealthy member of the agricultural body who generally does a good deal of advancing business. These men dispose of the grain they collect from their small circle to the *baiparis* agents, or merchants, of small marts in the neighbourhood, and they too are often given advances by *baiparis* and agents for the delivery of a certain quantity of grain at the time of or shortly after harvest.

At the next stage in the trading scale we find firms (kotis) or branches of firms in the marts or collecting centres, to whom the weighmen and *baiparis* sell the produce either for transmission to other parts of India, where higher prices are ruling, or to the ports for export.

Usually a firm of any standing has branches in several places with its head-quarters at one or other of them. One of the principal firms in the North-Western Provinces has, for instance, its head-quarters at Allahabad with branches at Calcutta, Patna, Cawnpore, Agra, Delhi, and several other places. Another smaller firm, with its head-quarters at Agra, has only branches at five or six places all within 100 miles. As the first firm collects in a larger circle than the second, so also there are circles still smaller in which the head-quarters of the firm is probably found at a more insignificant mart.

If a firm wishes to collect from a place in which it has no branch, it does so by sending a commission to a firm of that place, or to a commission agent called "aratya." Commission business is termed "arat," and the "arat" of a firm often constitutes its principal work.

Payment for produce is effected by a system of "hundis" or bills of exchange, which are more commonly drawn at 51 days than at any other date. The "hundis" of well known firms are current at the principal marts and are negotiated by shroffs or bankers.

Hundis are provided by a class of "bill-brokers" called "*dalals*," who are sent for by purchasing house or agent when hundis are required, and whose special business it is to know where hundis for every place of trade can be procured, and in what marts they are negotiable.

Credit is given under the hundi system to a limited extent. Each house has its "name" in the market for a certain capital and is allowed credit accordingly.

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BENGAL.

In no part of India, perhaps, is commerce more active than in Bengal. Calcutta is, of course, the centre and focus of the trade and commerce of the province, but there are many other large trade centres in the interior (shown in the accompanying map) situated on the great waterways of the country. The

state of trade and commerce in Bengal is illustrated by the following table taken from Mr. Cotton's report on the internal trade of Bengal for 1876-77. The figures merely show the quantities of staples passing the registering stations; and are neither exhaustive nor strictly accurate.

LIST OF ARTICLES.	By Country Boats.	By River Steamers.	By Rail.	By Road.	TOTAL.	
					Quantity.	Value.
	Mds.	Mds.	Mds.	Mds.	Mds.	Rs.
Rice and paddy—						
Rice not in the husk	18,280,600	35,500	4,469,500	1,900,200	24,995,800	5,68,02,000
Rice in the husk	5,903,400	—	29,800	877,300	6,810,500	
Wheat	2,733,000	10,300	4,822,500	20,900	7,586,700	
Pulses and gram	4,272,400	65,000	1,124,700	265,100	5,727,200	1,00,23,000
Other food-grains	1,843,000	—	107,300	314,000	2,264,300	39,63,000
Total of food-grains	33,032,400	420,800	10,553,800	3,677,500	47,384,500	8,59,61,000
Jute	9,178,600	587,900	3,382,400	242,500	13,661,400	4,09,84,000
Linseed	4,111,600	2,900	2,402,700	292,600	6,809,800	2,72,39,000
Mustard	4,005,600	96,900	1,266,400	217,000	5,585,900	2,23,44,000
Other oil-seeds	903,100	4,000	1,302,500	45,900	2,255,500	59,21,000
Total of oil-seeds	9,020,300	103,800	4,971,600	555,500	14,651,200	5,55,04,000
Indigo	40,950	160	115,170	410	156,690	3,13,38,000
Tea	12,200	266,900	95,300	—	374,400	2,99,52,000
Silk	14,408	355	17,132	37	31,930	1,59,65,000
Sugar (refined)	1,165,700	11,100	303,600	104,600	1,585,000	1,90,20,000
Ditto (unrefined)	2,278,900	—	562,700	119,300	2,960,800	1,18,43,000
Tobacco	1,724,100	22,300	280,900	113,000	2,140,300	1,07,01,000
Raw cotton	422,000	—	480,200	21,700	923,900	1,38,59,000
Hides	No. 1,421,200	No. 12,300	No. 3,502,700	No. 119,900	No. 5,056,100	1,01,12,000
Saltpetre	Mds. 337,000	Mds. —	Mds. 518,400	Mds. 19,300	Mds. 874,700	52,48,000
European piece-goods	Rs. 1,20,82,100	Rs. 56,77,200	Rs. 9,38,75,600	Rs. 30,17,600	Rs. —	11,46,53,000
Cotton twist (European)	Mds. 62,100	Mds. 2,900	Mds. 97,600	Mds. 7,500	Mds. 170,300	1,19,21,000
Salt	6,633,000	108,400	2,384,700	304,600	9,430,700	4,71,53,000

All the staples shown in this table, with the exception of salt and cotton piece-goods (which are exported from Calcutta into the interior of the country), find their way towards Calcutta chiefly by country boats along the magnificent water routes shown in the map. Along the lines of these established trade routes there has been an energetic and enterprising trading class from the earliest times. They have their agents in the interior who bring the surplus produce of each district to the most convenient point for embarkation. It may be said generally that every district in Bengal grows more than enough food-grains in ordinary years to support its own population, and exchanges its surplus produce for cotton piece-goods, salt, or food-grains of other kinds than those it grows itself. There is thus a constant ebb and flow of trade which penetrates more or less deeply from road, rail, and river into every district in Bengal. The further the distance of a district from the great highways of commerce, the smaller is the activity of its trade; the fewer the number of the trading classes, on the other hand, the larger

are its surplus stocks of grain. In times of ordinary and local scarcity the trading classes of Bengal are quite energetic enough as a body to supply the deficiencies of one district from the surplus of another, so long as the regular and established trade routes and connexions are available for the purpose. Only in cases of very isolated portions of the province—such as Orissa was in 1866—and in times of very widespread famine (as in 1874) would it be necessary to supplement the resources of private trade by State interference and assistance. Mr. Cotton says: "Nowhere in all India is internal traffic more active than it is in Bengal when the rivers are full of water, when every river is turned into a highway for the country craft laden with merchandise, every stream into a pathway, and every creek into a harbour for boats. During the dry season of the year, when the lesser rivers are not navigable, there is comparative stagnation in internal communication." These water-routes were largely made use of in the famine of 1874.

CENTRAL PROVINCES.

CENTRAL PROVINCES.
Mr. Nicholls.

In all the districts traversed by railways commerce is particularly active. The chief centres are Nagpur, Kamptee, Hinganghat, Wardha, on the railway and Toomsar, an entrepôt for grain in the Weingunga valley, and Dongargarh in the west and Raipur in the centre of the Chhattisgarh plain.

In the Nerbudda valley we have the manufacturing towns of Burhanpur, Khandwa, Harda, Seoni of the Hoshangabad district, Gadarwara, Narsinghpur, and Chota Chhindwara, Jubbulpore, and Murwarra.

There are large exports of grain from the Seoni, Chhindwara, and Betul districts. Saugor also has a

TRADE AND THE TRADING CLASSES.

fairly active trade especially towards the north. Comparatively speaking, commerce is dull in Damoh, Mandla, Bilaspur, Sambalpur, and Chanda.

The external trade of the provinces increased from 102,341 tons in 1863-64 to 390,106 tons in 1876-77.

The value in the former year was estimated at 3,909,008*l.* Cotton was then selling at extremely high rates owing to the American war.

Twelve years afterwards the external trade was valued at 8,113,619*l.*

The provinces have a fairly energetic and enterprising trading class in the districts in which there is brisk trade. In fact, elsewhere we have men of the trading class, possessed of capital and latent enterprise, but it is only where the railway penetrates or other adequate means of easy communication is opened out, that the energy and enterprise of the class is brought into play.

In the first rank as traders stand the Marwaris, to

be found throughout the provinces. Lately several European agencies have been opened at Nagpur, Jubbulpore, and Harda; at Hinganghat and Wardha the cotton trade is almost entirely in the hands of the Mofussil Company and of Messrs. Warwick Brothers; and during the late dearth in Bombay and the Deccan, swarms of Bhattias, Banias, and Comptis came into the provinces to purchase produce, and many native agencies from Bombay, of more or less permanency, have been established.

Chanda and perhaps Sambalpur may be said to subsist mainly on their own resources, and do not export much, at least as compared with the other districts. Mandla, Damoh, and Betul figure next in this respect.

The remaining districts enjoy an active ebb and flow of trade, but as the exports very greatly preponderate, most of the districts absorb large quantities of bullion.

BERAR.

The answer to this question is scarcely complete without reference to the weekly bazaars, which (besides numerous annual fairs) play such an important part in the machinery of distribution in these parts.

These bazaars are held weekly at some 300 places. Their attendance varies from 20,000 to some few scores of persons. The majority have a considerable attendance; and, besides brightening the whole life of the people, they stimulate trade and the interchange of commodities to an incalculable extent. It is quite a common thing for traders to go 20 miles to their bazaars.

And in point of commercial activity generally Berar stands very high. Apart from the traffic by railway, there is an active intercourse with the Central Provinces on the east: and in the cotton season every road carries cotton carts in search of a good market. Cultivators who are well enough off to sell their own cotton are by no means tied to one market. On the contrary, they are most keenly alive to any rumours regarding the demand for cotton at the various exchanges, and are quick to take their crop to the place where competition among buyers is greatest.

Since the introduction of the railway into Berar the trade of the province has been steadily increasing. The chief articles of exports are cotton, oil-seeds, wheat. And of imports, cotton piece-goods and yarns, iron, wheat, rice, sugar, spices, cocoanuts, salt.

The largest trade is carried on in cotton, the exports of which in the last four years have been valued as follows:—

	Rs.
1874-75	2,12,92,260
1875-76	1,62,90,970
1876-77	2,25,65,883
1877-78	2,27,99,291

The trade in wheat and oil-seeds for export to Europe is on the increase, although it has been interfered with during the past two years by the famine traffic on the line.

The total trade of the province, including road-borne traffic, the returns of which are, however, very incomplete, is reported to have been as follows:—

EXPORTS.

	Weight in Maunds.	Value Rs.
1877-78	4,054,911	3,77,07,998
1876-77	6,088,785	4,81,56,310

*In addition, articles were exported by numbers as follows:—

Animals	10,520	Timber	55,465
Earthenware	101	Firewood	4,324
Cocoa-nuts	178,379	Cows	16
Skins	396	Chinesewares	112
Mats	714	Leather	36

AP.I. QN.17. The actual traffic by railway, the route by which the chief trade of the province is carried on is, was follows:—

BERAR.

r. Dunlop.

IMPORTS.				EXPORTS.			
1877-78.				1877-78.			
	Weight in Maunds.	Value Rs.			Weight in Maunds.	Value Rs.	
Animals 97 } Numbers	1,454,194	1,86,76,991		Animals 21 } Numbers	3,531,699	3,38,17,932	
Cocoa-nuts 31,720 } Numbers	*31,887	4,86,462		Cocoa-nuts 569 } Numbers	*590	10,381	
*31,887 Total -	1,486,081	1,91,63,383		*590 Total -	3,532,289	3,38,28,313	
1876-77.				1876-77.			
	Weight in Maunds.	Value Rs.			Weight in Maunds.	Value Rs.	
Numbers -	1,226,452	1,91,57,244		Numbers -	5,375,003	4,49,34,564	
Total -	1,226,452	1,91,57,244		Total -	5,375,003	4,49,34,564	

The chief features of the trade of the province are exhibited in the following table, which is taken from the last Trade Report by the Commissioner, Hyderabad Assigned Districts:—

Articles.	Imports, Weight.	Exports, Weight.	Excess.		Remarks.
			Imports.	Exports.	
Sheep and goats -	16,328	2,935	13,393	—	Mostly from the south.
Cotton -	188,144	1,699,739	—	1,511,595	Nearly all borne produce.
Twist and yarn, European -	51,709	11	51,698	—	All railway borne from the west.
Piece goods, European -	24,746	4,278	20,468	—	By far the greater part enters by Raja Deulgaon.
Do. Native -	42,922	41,976	946	—	Imports chiefly from the east; exports to the south.
Wheat -	152,782	98,492	54,290	—	Imports 90,000 maunds, railway borne.
Gram and pulse -	10,718	—	10,718	—	" 30,000 " eastern frontier.
Rice -	270,873	25,048	245,825	—	" 19,000 " southern frontier.
Other rain crops -	246,923	1,592,954	—	1,346,031	Exports 38,000 " railway borne.
Hides of leather -	8,180	748	7,432	—	" 46,000 " southwards.
Skins of sheep, &c. -	30	119	—	89	All from the Narbada Valley.
Horns -	2,966	5,721	—	2,755	Imports 216,905 maunds, railway borne.
Lac dye -	4,371	8,683	—	4,312	" 44,004 " eastern frontier.
Brass and copper -	3,472	1,738	1,734	—	" 174,000 " railway borne.
Iron -	—	—	—	—	" 31,879 " eastern frontier.
Other metals -	113,618	6,632	106,986	—	" 23,434 " southern.
Oils -	8,564	1,811	6,753	—	Exports 1,460,000 " railway borne.
Opium -	3,963	3,276	687	—	" 100,000 " eastern frontier.
Ghee -	14,362	19,685	—	5,323	From the south.
Salt -	371,189	33,776	3,37,413	—	Railway borne; must be all produce of Berar.
Silk, raw -	4,026	1,020	3,006	—	Import, railway borne; export, do.; difference must be Berar produce.
Spices -	20,252	2,512	17,740	—	Import from east chiefly.
Sugar, refined -	5,379	4,256	1,123	—	No trade to speak of recorded.
Do. unrefined -	191,569	2,345	189,224	—	Import almost all by railway.
Tobacco -	4,314	19,135	—	14,821	Import from south and west.
Oil seeds -	64,720	333,763	—	269,043	Import 3,963 maunds, railway borne.
					" 8 seers, southern frontier.
					" 2 " western frontier.
					Export 2,412 maunds railway borne.
					" 330 " eastern frontier.
					" 534 " southern frontier.
					" 1 seer, western frontier.
					Export to east and south chiefly.
					Import all by rail.
					Railway import 11,000 maunds, southern frontier
					3,915, eastern frontier 3,791 maunds.
					Nearly all imports railway borne, but refined and unrefined not distinguished.
					Exports 9,262 maunds, eastern frontier.
					It is impossible to distinguish the different kind of oil seeds with accuracy, so I have not attempted it: nearly all export was by rails
					Imports came chiefly from the north and south.

BOMBAY.

Kaira.—Trade is brisk and the trading class energetic. Kaira exports grain, tobacco, ghee, oil, and timber. The Collector gives the grain traffic in 1876 as

	Tons.
Exports -	21,344
Imports -	1,432 { (Probably rice for the rich.)

He estimates the export of tobacco at 7,292 tons. The recent opening of railway feeders has done much to develop trade. Kaira imports piece-goods, sugar, iron, timber, twist, and many other things.

Broach.—There is an active trade in raw cotton, the value of cotton exported in 1874 being 1,376,508*l.*, for preparing which there were 31 steam factories, *i.e.*, gins, presses, and spinning mills. Broach also exports wheat to Bombay and millet to Kattywar and Katch. The grain export was valued in 1874 at 25,245*l.* Broach imports gram, rice from Thana, metals, sugar, piece-goods, and timber. The gross imports in 1874 were valued at 616,177*l.*, of which 255,330*l.* was the value of commodities consumed in the district.

Surat.—There is a large export of raw cotton, timber, and grain, and import of metals and piece-goods. There are two spinning and weaving factories at Surat. The manufactures are common and fine cloth, silk, brocade, embroidery.

Thana.—The district is poor and the trading class insignificant. The exports are rice, salt, and timber. Thana grows its own food supply. The import trade is small.

Colaba.—There is not much trade and no energetic trading class. Colaba subsists on its own resources.

Khandesh.—Commerce not very brisk. The trade is chiefly conducted by merchants from Bombay, who have of late years established firms for the exportation of grain, cotton, and seeds, which form the chief articles of trade. Khandesh grows its own food supply and stores or exports a surplus. Timber is exported from the Dang forests. The imports are metals, cloth, and groceries.

Nasick.—Is an agricultural district. The grain trade is chiefly for local wants, but there is some export by rail to Bombay. The district grows much more grain than it consumes. The Collector mentions no other trade or industry.

Ahmednagar.—No information offered by the Collector. The products are (1) bajra, (2) joar, (3) oil seeds, (4) wheat, and a very trifling crop of cotton. The circumstances are probably the same as those of Nasick.

Poona.—There is no trade in the Poona district except in grain. The surplus over consumption is exported to Bombay, but not much wheat or oil seeds

are grown and scarcely any cotton. The imports are metals, piece-goods, and salt.

Sholapur.—The Collector says, "trade is active" and the traders enterprising. There is a constant "flow of trade." But he does not say in what. Sholapur produces a trifling crop of oil seeds and a less one of cotton. The other products are chiefly millets, which are largely exported towards both Bombay and Madras.

Satara.—There is little or no commerce and no enterprising trading class. The grain is chiefly grown for consumption. Satara exports molasses, pepper, and a little cotton, and imports rice, salt, cocoanuts, and dried fish. The trade is with the coast.

Kaladgi.—Considering the isolated position of the district, the trade is fairly active. The cotton grown in the south part finds its way to the coast, and wheat grown in the valley of the Done is exported to Sholapur and elsewhere. In return come rice, salt, piece-goods, and silk. The produce of the silk and cotton looms in the south has a wide reputation, and the manufactures are exported into the Nizam's dominions and Madras. Except a few large firms, the traders only operate locally. Communications require to be improved. In the south and south-west large quantities of grain are stored in good years, because it would not pay to export it.

Dharwar.—Commerce is active and the traders energetic. The district supplies its own food in average years. Cotton is exported to the coast, but the carts return empty, and the imports are few. Grain is imported when prices are high.

Canara.—The traders are few, but well-to-do and fairly active. There is an export trade in areca nuts, cardamoms, pepper, and rice, and the imports are salt, grain, and piece-goods.

Ratnagiri.—Trade is active with the Deccan and with Bombay from the large towns and at the heads of the tidal rivers. The local trade consists in importing and distributing grain for consumption, and exporting salt-fish, shell-lime, and cocoanuts. No part of the district subsists on its own resources.

With reference to this question and question 3 above, the information of the Collectors as to disposal of the produce of their districts and the amount of imports consumed, seems vague and incomplete. The following tables may be of use. They show the export and import of food grains from and into the districts which are traversed by the railways in 1873 and the first half of 1874. This will be chiefly their own produce exported, and rice or wheat imported for the food of the wealthier classes, or common grain imported where the local production fails.

BOMBAY, BARODA, AND CENTRAL INDIA RAILWAY.

STATEMENT showing Quantity of Food Grain, Outwards and Inwards, at each of the Collectorates, for the Half-Years ended 30th June and 31st December 1873 and 30th June 1874.

Half-Years.	Bombay Collectorate.		Tanna Collectorate.		Surat Collectorate.		Broach Collectorate.		H. H. the Guicowar's Territory.		Kaira Collectorate.		Ahmedabad Collectorate.		Kattiawar.		Other Lines.		TOTAL.
	Outwards.	Inwards.	Outwards.	Inwards.	Outwards.	Inwards.	Outwards.	Inwards.	Outwards.	Inwards.	Outwards.	Inwards.	Outwards.	Inwards.	Outwards.	Inwards.	Outwards.	Inwards.	
June 1873 -	1,742	2,516	303	85	1,905	6,800	1,038	1,144	380	2,494	4,566	561	6,058	1,397	13	1,454	914	378	16,919
December 1873 -	782	2,217	117	110	1,562	1,454	1,373	540	343	2,620	388	1,115	4,421	850	113	945	1,266	514	16,365
June 1874 -	323	2,207	654	202	3,212	4,782	897	1,435	237	4,232	2,635	1,072	7,297	1,592	16	1,588	2,154	315	17,425

G. I. P. RAILWAY.

STATEMENT showing Quantity of Food Grains, Outwards and Inwards, at each of the Collectorate, for the Half-Years ended 30th June to 31st December 1873 and 30th June 1874.

Half-Years.	Bombay Collectorate.		Tanna Collectorate.		Nasick Collectorate.		Khandesh Collectorate.		Poona Collectorate.		Sholapur Collectorate.		Other Lines.		TOTAL.
	Outwards.	Inwards.	Outwards.	Inwards.	Outwards.	Inwards.	Outwards.	Inwards.	Outwards.	Inwards.	Outwards.	Inwards.	Outwards.	Inwards.	
June 1873	4,526	752,334	35,739	44,369	255,724	31,464	33,046	141,223	10,272	284,377	228,250	8,326	129,100	81,622	
December 1873	4,580	851,588	18,314	35,853	246,071	19,991	27,610	67,103	17,248	203,005	189,750	8,639	23,989	272,544	
June 1874	801	1,491,441	14,232	28,095	830,107	13,416	90,759	54,113	26,021	107,205	422,387	8,250	3,328	1,584,901	

NOTE.—The figures here are maunds of 80 lbs. each.

With these tables may be compared the following figures for 1876-77 :—

On the G. I. P. RAILWAY, 1876-77.

	Bombay.		Thana.		Nasik.	
	Exports.	Imports.	Exports.	Imports.	Exports.	Imports.
Food-grains in tons	36,314	267,166	7,675	7,542	19,920	18,154
	Khandesh.		Poona.		Sholapur.	
	Exports.	Imports.	Exports.	Imports.	Exports.	Imports.
Food-grains in tons	11,703	19,158	14,478	91,418	23,796	57,924

On the B. B. and C. I. RAILWAY, 1876-77.

	Bombay.		Thana.		Surat.	
	Exports.	Imports.	Exports.	Imports.	Exports.	Imports.
Grain and seed (tons)	2,281	46,762	1,435	1,259	8,619	24,545
	Broach.		Kaira.		Ahmedabad.	
	Exports.	Imports.	Exports.	Imports.	Exports.	Imports.
Grain and seed (tons)	3,222	15,832	23,653	3,333	73,438	9,350
					Kattywar.	
	Exports.	Imports.	Exports.	Imports.	Exports.	Imports.
Grain and seed (tons)	3,222	15,832	23,653	3,333	73,438	9,350

An idea of the extent and character of the traffic carried on by rail may be gathered from the following :—

STATEMENT showing the Traffic on the Madras Railway during the Years 1875, 1876, and 1877.

Articles.	1875.	1876.	1877.
	Tons.	Tons.	Tons.
Cloth	5,802	5,568	4,403
Coffee	4,943	6,049	4,165
Cotton	30,626	23,493	1,686
Grain	7,076	38,640	495,110
Gram	24,558	40,715	57,803
Iron	8,999	9,458	8,435
Jaggery	9,390	7,272	7,580
Paddy	6,504	14,982	25,997
Ragi	9,376	22,180	16,462
Rice	75,180	101,326	129,764
Salt	48,034	51,513	58,656
Sundries	149,581	158,400	150,362
Timber	17,342	15,164	10,729
Twist	4,393	5,006	3,822
Railway materials	797	887	1,631
Harbour do.	13,055	114,886	14,875
Total	415,656	615,539	991,480

MADRAS.

STATEMENT showing the Traffic on the South Indian Railway during the Years 1875 to 1877.

Articles.	1875.	1876.	1877.
	Tons.	Tons.	Tons.
Areca nuts	2,379	3,196	2,656
Cloth	2,308	4,075	2,772
Cotton	—	878	1,027
Curry-stuffs	4,628	7,079	5,674
Fruits and vegetables	2,410	2,961	4,095
Grains of all kinds	42,067	70,772	232,998
Granite stones	8,170	18,619	35,815
Oil and ghee	2,122	3,215	2,282
Oil-cakes	2,640	6,124	5,985
Salt	11,570	16,527	21,045
Seeds of all kinds	7,508	11,609	9,994
Sundries	22,271	30,893	41,479
Tobacco	893	1,154	2,002
Hides	1,213	1,637	2,339
Total	110,179	178,739	375,664

No statistics are available with regard to the traffic by road.

A difficulty arises in determining the standard of activity and enterprise by which the trading class of each district is to be tested. Most Collectors answer

the question in the affirmative, and it seems probable that some of those who have not done so have taken a different view of what constitutes activity and enterprise in a trading community. The experience of the late famine has tended to show most conclusively that, under very diverse conditions and most difficult circumstances, the ordinary traders of the country are able to organise and carry on an entirely new trade with very decided general success, and the Board consider that they are warranted in saying of the Presidency generally that it has an energetic and enterprising trading class. From the census tables of 1870-71 it appears that 3·4 per cent. of the male population were returned as engaged in trade. Many Collectors testify specially to the energy of the Mahomedan traders, and with regard to the Hindu commercial castes, Dr. Cornish, the compiler of the census tables, remarks: "They have not the whole field to themselves; for many Mahomedans and Hindus of other castes are now competing with them; but they hold their own as communities possessing capital, gifted with the spirit of enterprise and free from the vice of personal extravagance, must always do."

The proportion of traders to the male population in the different districts was as under :—

Ganjam	-	-	-	4·9
Vizagapatam	-	-	-	4·2

Godavari	-	-	-	4·0
Kistna	-	-	-	3·9
Nellore	-	-	-	4·3
Cuddapah	-	-	-	3·4
Bellary	-	-	-	3·4
Kurnool	-	-	-	4·1
Chingleput	-	-	-	2·3
North Arcot	-	-	-	3·5
South Arcot	-	-	-	2·2
Tanjore	-	-	-	3·6
Trichinopoly	-	-	-	2·6
Madura	-	-	-	3·4
Tinnevely	-	-	-	3·8
Coimbatore	-	-	-	2·8
Nilgiris	-	-	-	3·0
Salem	-	-	-	2·3
South Canara	-	-	-	2·4
Malabar	-	-	-	3·3
Madras	-	-	-	7·8

In ordinarily favourable years most of the districts of the Presidency subsist mainly on their own resources as far as regards the staple food of the population, but there is a steady ebb and flow as regards other agricultural produce, salt, piece goods, metals, &c. &c.

MYSORE.

Traders always have been very active in this part of the country—there are numbers of the trading classes in all large towns. They are as a rule intelligent, energetic, and enterprising people, and they were quite equal to the occasion during the famine. Prior to the famine the trade in grain, cocoa-nuts, betel nuts, tamarinds, chillies, and jaggery, all of which are

Mysore exports, was most brisk and encouraging, and the ebb and flow of trade was all that could be desired. The import of salt, iron, cotton, vegetable oils, ghee, and the precious metals was in those days very considerable, but during the prevalence of the famine, the whole character of the imports changed, and grain took the place of everything else.

RAJPUTANA.

Captain Barr, Marwar.—There is but little activity of commerce in this province. Marwar is well known as the birth-place and home of perhaps the most enterprising class of natives, but the Marwaris who enrich themselves by mercantile operations in other parts of India do not do much good to their native country. It is true that their love of home is strong, and that many of the wealthiest Marwari merchants, who have their places of business in Bombay, Calcutta, Malwa, the Deccan, Madras, and even in China, return periodically to Marwar, some to marry, others to give their sons and daughters in marriage, and many to end their days in their native country; but the energy and enterprise of these Marwari merchants is expended in other countries and the benefits of their habits are alienated from Marwar. The country itself has but little trade. Most of the districts are self-supporting, and it is only in years of scarcity that grain is imported. In years of unusual abundance grain leaves the country,

but taking the average, it may be assumed that export and imports are small, and the ebb and flow of trade is neither active nor constant.

Major Powlett, Kotah.—Kotah has only two considerable resident merchants; but it has branches from large foreign houses. Its chief exports are grain and opium; and its imports English cloth and spices.

The same may be said of Boondie. But the latter exports more to the north; Kotah more to the south. In times of scarcity, notwithstanding engagements to the contrary, the export of grain is checked in all native states. It is, however, forbidden by Government so far as it directly affects the grain-supply of cantonments. Practically, less harm to outlying districts is done by the temporary restriction than would be supposed; for merchants in times of plenty establish stores of grain in British territory, whence they can be moved freely where wanted.

CENTRAL INDIA.

Bhopal.—A large export trade in opium, cotton, jaggery, and grain.

Baghelkhand.—No commerce except at Satna, where salt and piece goods are extensively imported, and wheat, ghee, and linseed exported.

Rutlam.—Opium, cotton and oil seeds are exported to Bombay.

Bhopal.—A metalled and bridged road to G. I. P. Station at Etarsee. Carts are used in dry season, and at other times pack-bullocks.

CHAPTER I.—QUESTION 18.

CHAP. I. QN. 18.

What are the facts in your province as regards the means of communication? Do bridged and metalled roads connect all the important centres of trade that should be thus connected? Are the roads in good working order, and sufficient for the traffic on them or not? Are they open through the year, or closed for wheeled-traffic in the rains? Is the ordinary means of conveyance by wheeled carriage, or by pack-bullocks; and if by wheeled carriage, is there a sufficient number of carts in the district for all its wants? What is the ordinary cost per mile of conveying one ton of merchandise either by wheeled or by pack-carriage?

PUNJAB.

PUNJAB.
Major Wace.

I append a return of the roads in the province completed to 31st March 1878, which has been furnished by the Public Works Department. It shows that the total length of these roads was on that date—

	Miles.
Metalled and bridged	1,255
Partially „ „	664
Unmetalled	20,030
Total	21,949

The principal lines of road are shown in a skeleton map (scale 32 miles to an inch) which faces this report. It would not be practicable to show every road on so small a map.

Metalled roads.—The principal one commences at Delhi; and thence runs in a north-westerly direction through Lahore to Peshawar, traversing in its course the richest and most populous tracts of the province. Before the railways were constructed, this road was of the greatest value. And though the railways now relieve it of its heaviest traffic, it is still desirable to keep it up. Its total length is 579 miles. The next in importance are:—the road from Delhi to Sirsa, as yet only partially metalled, 165 miles; that from Delhi towards Mathra, 46 miles; from Amballa to Simla, 92 miles; from Ludhiana via Ferozepur to Lahore, 141 miles; from Amritsar to Pathankot, 68 miles; and from Wazirabad to Sealkot, 30 miles. These roads are usually made of rammed kankar,* width and cost as noted at the end of this reply.

Unmetalled roads.—Each district is thoroughly intersected with roads of this class; and so far as the funds of district committees permit, they are bridged. The cost of construction and maintenance is small; and from the first years of our administration in the Punjab great attention has been paid to the connection of all places of importance in each district by roads of this character. Besides the roads thus returned, which are principally roads constructed and improved since annexation, there are great numbers of village roads all more or less suited to the local traffic. In short, so far as rough roads are concerned, those existing in every district much more than meet present local requirements.

Bridges and ferries.—The main rivers of the Punjab are of such width and volume, and their channels so shifting, as to make the erection of permanent bridges over them for the ordinary traffic of the country a task far beyond the present financial

* Kankar is usually described as nodular limestone, and is a calcareous deposit plentifully found in beds some four or five feet below the surface of the land in loamy soils in most of the submontane districts. It forms a description of limepan, and the soil is greatly benefited by its removal. It is usually composed of carbonate of lime and of silica and alumina, in nearly equal proportions. (Ansted's Elementary Geology, p. 349.)

resources of the province. The place of such bridges is however efficiently supplied by temporary boat bridges on the main lines of traffic, and by ferries at the less important lines. The boat bridges are erected in September, and usually stand till April, May, or June, when they are dismantled. The rivers swell so greatly with the summer melting of the Himalayan snows, and the floods of the autumn rains are so high, that it is not practicable to maintain such bridges on the larger rivers between June and September. The traffic is slack in these months; and so much as there is, is ferried across in boats. As regards the bridging of the minor drainage channels of the country, it may be stated generally, that great progress has been made, and that the shortcomings still existing are not such as to cause any material hindrance to trade, nor can they be very rapidly supplied in the existing state of the local revenues.

Are the roads in good working order, and sufficient for the traffic on them or not? Are they open throughout the year, or closed for traffic in the rains?—The first of these two clauses may be briefly answered in the affirmative. It is not thereby meant that there is no room for improvement, nor desire to improve existing communications. On the contrary, both the Government and the District Committees pay continuous attention to the matter. But there is no part of the province in which any crying want exists, or which is not, roughly speaking, very well supplied with all necessary roads.

As regards the second clause, the roads may be stated roughly to be open throughout the year. The Punjab rains are not so heavy as those of Eastern and Southern India. Carts can work on the metalled roads all the year round; on the unmetalled roads also they can work, except for a few days after a heavy rainfall. Camels cannot work in rainy weather, their feet being unsuited for wet ground; they are also out of condition during the autumn rains, and it is consequently unusual to load them then.

Tolls.—The roads of the country are free of all tolls, except at the ferries and boat bridges on the larger rivers. Small dues are levied at these points; The proceeds yield a surplus over and above the cost of maintaining the boat bridges and ferries; which is added to the local rates paid by the landowners of each district, and aids in the maintenance of the roads. The only road toll-bars in the province are one on the hill road to Murree, and two on the hill road to Simla and its prolongation towards Tibet; all three entirely exceptional cases, justified by the great cost of these roads and by the exceptional benefits they confer on those who use them.

Is the ordinary means of conveyance by wheeled carriage or by pack-bullocks? and if by wheeled carriage, is there a sufficient number of carts in each district for all wants?—The ordinary means of con-

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veyance is by bullock-hackerie in the districts east of Lahore, and by camel in those west of Lahore.*

In the four western divisions of the province, (Rawalpindi, Peshawar, Multan, and Derajat), there is hardly any wheeled carriage; of 97,909 carts, only 2,789 belong to these divisions. On the other hand, the three divisions of Rawalpindi, Multan, and Derajat contain 120,117 out of the total estimated number (165,567) of camels belonging to the province. Camels are also largely used in the Hissar division, which possesses 25,589 of these useful animals.

There are no indications that the supply of carriage is insufficient. On the contrary, the camel drivers complain that they cannot get so much work as before, and attribute this to the development of the railways. Though reared, owned, and usually pastured in the dry western tracts of the province, they work much in the eastern districts; and no doubt, as regards these districts, the railways have largely supplanted them. In the hill districts of Hazara and Kangra the carriage is mostly by pack bullocks and mules. The statement appended, showing the carriage of each district, is taken from the Punjab Administration Report for 1876-7.

What is the ordinary cost per mile of conveying one ton of merchandise, either by wheeled or packed carriage?—The only wheeled carriage in the province of importance to trade are bullock-hackeries; the only pack-carriage, camels. I, therefore, confine my reply to these two descriptions of carriage. In a statement appended I have collected the rates charged on the most important roads in the province; but the rates charged by carriers depend so much on the dulness or briskness of local trade, that some discrimination is needed in applying the results shown in this statement. There does not seem to be any material difference between the cost of carriage by camels and by carts. The rates appear to vary generally between 1½ and 2½ annas per ton per mile. The higher rate and rates exceeding 2½ annas are more frequent on unmetalled roads than on metalled roads; but the schedule does not show so much difference between the charges on these two classes of roads as would have been expected. Some of the cheapest rates occur on roads which are railway feeders, where no doubt the demand for carriage is steady.

It is worthy of note, that the rates for carriage

* To this statement I should note one exception. Carts, owned most of them by natives of districts east of the Ravi, work in great numbers on the metalled grand trunk road between Lahore and Peshawar.

supplied by civil officers to troops (which were purposely fixed some years ago after considerable inquiry at rates more liberal than those usually paid by private employers), worked out to a rate per ton per mile, yield a rate of 3½ annas for bullock-hackeries, and 2½ annas for camels. I mention this as these rates are the outcome of an investigation entirely independent of that under report; and allowance being made for the higher rates necessarily paid for carriage supplied to troops, as well as for the fact that food grains are usually carried at the cheapest rates practicable, the results of the two inquiries fairly correspond.

Cost of roads.—The following details concerning the sums annually spent on roads in the province will be interesting in connection with this subject. During the three years ending 1877-8 the average sums spent each year on roads were:—

	Rupees.
On construction of new lines	5,08,526
On repairs and maintenance of new lines	11,02,269
Total	16,10,795

Of this total sum Rs. 6,60,266 was spent directly from district funds by the district committees; and the balance, Rs. 9,50,529, was contributed from the general local fund and provincial revenue.

Metalled roads.—The road surface varies from 30 to 40 feet; of which from 10 to 16 feet are metalled; the most common width of metalling is 16 feet. The cost of construction varies largely according to circumstances. The roads with the heaviest traffic, constructed by the engineers of the Public Works Department, cost (omitting the larger bridges) Rs. 10,000 per mile.

The smaller roads and roads with less traffic constructed by district committees and civil officers cost from half to three-fourths of this sum. Repairs and maintenance cost on the former class of roads from 500 to 800 rupees per mile; on the latter they are usually less than Rs. 300 per mile per annum.

Unmetalled roads.—The cost of construction varies according to the amount of bridging required by the nature of the traffic.

The rough country road, which is ordinarily sufficient for the interior traffic of a district, can be well made for Rs. 300 a mile, and maintained for Rs. 30 a mile per annum. The better class of unmetalled road, carrying much traffic, cost from Rs. 60 to Rs. 300 a mile to maintain; the average annual charges on 15 such roads gives Rs. 120 per mile.

NORTH-WESTERN PROVINCES.

NORTH-
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PROVINCES.
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Roads.—A first-class road is one which is raised above the level of the country, bridged and metalled. A second-class road is one which is raised and bridged but not metalled, the roadway being on the ordinary soil of the country. But although classed as "bridged," most of these roads are interrupted by the larger rivers of the provinces, and the bridges are only over the smaller streams or watercourses which cross them.

For all roads which do not follow the course of the main rivers, the streams of the Gogra, Ganges, Jumna, and Betwa offer serious interruptions.

The Jumna is crossed by railway bridges at Allahabad, Delhi, and on the Punjab frontier above Saharanpur; at the two former places the bridges are furnished with subways for passengers and traffic. Permanent pontoon bridges are also maintained at Muttra and Agra, and a third pontoon bridge has lately been constructed at Kalpi. The Ganges is

crossed by railway bridges at Rajghat and at Cawnpore; at the latter place there is a subway for traffic. At all other points where roads of any importance meet the Jumna and Ganges, and at all points where such meet the Gogra and Betwa, a bridge of boats is only maintained during the cold and hot weather months, when the water is low. Above the Alighur district such temporary bridges are very numerous across the Ganges, but below Cawnpore it is only bridged in this way at two or three places, the chief of which are Allahabad and Benares. The Gogra is not bridged at all below Fyzabad.

During the rains, therefore, most of the first-class roads are interrupted where they meet any of these rivers and traffic, and passengers have to cross by ferries.

The provinces are well provided with first and second class roads, except perhaps along the margins bordering on the Himalayan and Vindhyan hill ranges

There is a third class of road, which includes roads unmetalled and unbridged, which are also maintained by Government. These are not shown in the map, but are in some districts very numerous and serviceable in fair weather. The character of the country in the Ganges Jumna Doab, flat and dry, except in the rains, allows of cart-traffic travelling along almost any kind of road, bridged or unbridged, for some seven or eight months of the year, and, though in the rains unmetalled roads may get swamped and unbridged roads blocked by streams, yet in no case is there such necessity for either bridging or metalling as in the damper tracts north of the Ganges and Gogra. Third-class roads are however better in the easterly districts, where there is less sand and the soil is firmer and more consistent than in those towards the westerly end of the provinces. The best metalling is made of kankar, a form of carbonate of lime, which occurs in irregular deposits, a few feet below the surface of the ground. Kankar is found in more or less profusion throughout the Doab districts, but is far less common in the damp and waterlogged tracts, where its need is most felt. In the sub-Himalayan districts its place is sometimes supplied with stones, broken small, generally obtained from the bed of some stream or mountain torrent. For this reason it will be noticed that first-class (or metalled) roads are far less common in districts in the two northern of the belts described in the answer to *query 3*, than in the southern belts.

The tracts which lie immediately under the Himalayas are much intersected by narrow streams called "*sots*," which always need bridging, as well as by torrent beds, dry during eight months of the year, but filled with rushing water in the rains, which, if a road is to be passable all the year round, must be also bridged. Nothing but the most solid and carefully constructed masonry can stand the violence of these torrent streams. Between the town of Najibabad (in the Bijnor district) and Hardwar there are some 18 miles of road, on which the ruins of no less than six masonry bridges may be seen, which once spanned torrent beds, now impassable in the rains, though completely dry at other times.

The difficulty of using unmetalled roads in districts bordering on the Punjab, owing to the prevalence of sand, has been already implied. Their condition, if anything, improves in the rains, for the simple reason that wet sand is more consistent than dry. In Bundelkhand, and along the edge of the provinces which is fringed by the Vindhyan range, there are difficulties as great or greater than those in the sub-Himalayan tract. The torrents of the Betwa and other streams can in the rains only be crossed with great difficulty by means of ferries, the former river often almost completely cutting off the Lalitpur district from communication with the rest of the provinces. Another difficulty with Bundelkhand roads lies in the soil. The black earth known as "*mār*" or "*cotton soil*" is common there, which in the rains becomes thick tenacious mire, making unmetalled roads running over it quite impassable, not only for carts, but also for pack-animals. The deputy commissioner of Jhānsi writes that even on unmetalled roads:

"Traffic is much hindered by the unbridged rivers, more particularly the Sindh, Betwa, and Dhasn, which in times of high flood are often impassable for days together. The earthwork of the ghāts also is always liable to be cut away, making them very difficult for the passage of carts. The unmetalled roads in the district are practically closed for wheeled traffic throughout the rains, and those which pass through black soil are often impracticable for pack-bullocks."

It appears, therefore, that in the rains little or no traffic is possible in the tracts which lie near the Himalayan or Vindhyan hill ranges, for even the roads classed as bridged are there often interrupted by unbridged rivers or streams. In the districts which lie between those tracts, traffic is possible during the rains on first-class or metalled roads with ease, where

such do not meet any of the larger unbridged rivers at points other than Muttra, Delhi, Agra, Allahabad, or Cawnpore, and with difficulty when any of these rivers has to be crossed by ferry.

The means of conveyance vary with the character of the country. In the districts which lie along the centre of the provinces, bullock-carts (or "*chakras*") are most commonly used. The pattern on which these are constructed differs but little throughout these districts, and the load carried in them varies according to the number of bullocks and the class of road they are to travel over. The most usual loads average 10 or eight maunds for each pair of bullocks employed in drawing.

These carts go from 12 to 16 miles a day; at night they halt in camping grounds, which are set apart for this purpose at intervals along the more frequented roads. The charges for carriage are not, as a rule, calculated on the mileage with any pretence at accuracy. There is in each place a series of fixed fares to and from all other places with which there is much cart traffic.

The following are a few of the fares from Mainpuri:—

	Distance. Miles.	Rate per maund.	Per ton per mile.
To Etāwah	- 35	Rs. a. p. 0 3 0	Rs. a. p. 0-2-4
Farukhabad	- 40	0 3 0	0-2-4
Cawnpore	- 107	0 6 0	0-2-0
Mainpuri	- 310	1 0 0	0-1-5

The rates for carriage per ton per mile quoted in the district replies would all appear to be merely calculated from these customary fares, and vary from Re. 0-1-9 in Ghāzipur to Re. 0-3-9 in Jhānsi. Generally speaking, the fares are lower in the districts situated in the central belt, where metalled and bridged roads are common, than in the border tracts, where the communications are less favourable. In some districts they vary with the season and with the class of road to be travelled over; thus in Jhānsi the usual rates are given as Re. 0-2-6 for metalled roads and Re. 0-2-9 for unmetalled, which in the rainy season are raised to Re. 0-3-6 and Re. 0-3-9 respectively. The average rate for cart carriage may then be put at Re. 0-2-7 per ton per mile.

From the district replies it appears that in each district there are enough carts for ordinary transport purposes. Their numbers are, however, considerably diminished by every new line of railway which competes with the roads they ply on. The collector of Jaunpur writes on this subject:—

"I am informed that the introduction of the rail-road has had the effect of diminishing the number of carts. Last year, when traffic was choked at Benares, I inquired of some merchants who wished to send grain towards Bombay why they did not take it in carts to Allahabad, and was told that carts could not be obtained."

Not only is the cost of carriage by cart very much in excess of that by rail, but there are numberless risks from which goods carried by rail are free, and must be held to add to the total expense. Besides the risk of loss from exposure to the weather, from theft, or the dishonesty of the cartmen, there is another danger arising from the length of time taken in the journey; prices may change, and a sudden fall may ruin the venture altogether.

As stated before, the conveyance of goods on pack animals is commonest on the borders of the provinces. Towards the Punjab, where the ground is sandy and carts can travel with difficulty, camels are not uncommon, which come across from the Punjab and Rajputana to the trading towns of the Meerut division. In this part of the country donkeys are also commonly employed for ordinary local trade, each animal carrying about two maunds. Bullocks are the means of conveyance used by the Banjāras, the itinerant grain and salt dealers of Central India. These men do some

trade with the Bundelkhand districts, and in them bullocks are the pack-animals most commonly used. Bullocks are employed, but less generally, throughout the provinces, the rates per ton per mile given by district officers varying from Re. 0-3-0 (Jhānsi) to 0-4-4 per mile.

On the Nepal and Kumaun frontier ponies are the pack-animals chiefly employed. The collector of Gorakhpur states that pack bullocks or buffaloes are but little used, and estimates the rate for pony carriage as Re. 0-4-0 per ton per mile. When the carriage is in the Hills themselves the rates are greatly increased, and the labour of coolies is much employed. The Dāra pass leading into the Gonda district is only practicable for coolies, and in Kumaun and Garhwāl coolies, with mules and ponies, are the ordinary means of conveyance, the estimated rates being

Re. 1-3-0 per ton per mile for the latter and Re. 1-7-0 the former.

Sheep are employed in carrying goods between Kumaun division and Thibet, being the only pack-animals which can be used with safety in crossing the difficult snow passes.

The following are the average loads carried by each of these different means of conveyance:—

Bullock-cart	-	-	10 mds. to 50 mds.
Camel	-	-	5 "
Buffalo	-	-	5 "
Bullock	-	-	3 to 4 "
Pony	-	-	3 "
Donkey	-	-	2 "
Coolie	-	-	1 maund.
Sheep	-	-	10 seers.

BENGAL.

The state of communications in the province by rail and river has been fully explained in the answers to questions 19 and 20. As regards roads, it will be best elucidated by a reference to the accompanying statement. It will be seen that the number of "all-weather," or "bridged and metalled," roads is but small compared with the mileage of "fair-weather" roads. The physical conditions of the province render bridging and metalling impossible to any large extent, not only on account of the original expense that would be incurred in their construction, but also by reason of the heavy cost of maintenance. Roads in Bengal are, generally speaking, feeders to rail or river. The traffic on them is greatest in the dry months, after the great winter rice-harvest of the year has been gathered in and threshed out, so that metalled roads are not required for any but the principal routes. For pack-bullocks and ordinary carts, the ordinary "fair-weather" road is all that is necessary. Since the introduction of the Road Cess Act the funds collected under its provisions are spent solely and entirely within the district which provides them. Each district has its own engineer and subordinate engineering establishment working under the general control of the district officer. The result has been that new roads have been made in

every district strictly in accordance with its own wants, and by degrees no part of any district will be left unprovided with such communications as will ensure the full and free flow of such inward and outward traffic as the conditions of the season may demand. In the hilly portions of the province, and in such parts of the interior as have not yet been provided with roads, the traffic is chiefly by means of pack-bullocks; whenever there are good roads and near large towns it is by cart. The number of carts always increases with the increase of facilities of communication. Pack-bullocks and carts together, each district has quite enough for all its ordinary requirements. It would not, of course, be possible to keep up a reserve of either to meet any extraordinary pressure. The experience of 1874, which is a very extreme case, shows that means of transport are always forthcoming when they are wanted. On a rough estimate, the cost per mile of conveying one ton of merchandise by cart ranges from three to four annas, and by pack-bullocks from one to two annas. These are the rates charged to outsiders; to those who carry their own grain to market by means of their own carts or bullocks the cost would, of course, be merely nominal.

STATEMENT showing the NUMBER of MILES of PROVINCIAL and DISTRICT ROADS of each kind in each DISTRICT of BENGAL.

Civil Divisions of Commis- sioners.	Districts.	Number of Miles of Pro- vincial Roads.		Total.	Number of Miles of District Roads.				Total.	Grand Total.	Remarks.
		Metalled.	Unmetalled.		Metalled.	Bridged, but unmetalled.	Not bridged and unme- talled.	All other Roads.			
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
Burdwan	Calcutta -	24	—	24	—	—	—	—	—	24	(a) Mileage not known. (b) Number and mile- age not known.
	Burdwan -	123	4	127	98	227	220	10 roads (a), besides village roads (b).	545	672	
	Bankoora -	60	—	60	209	—	—	69, besides 2 roads (a).	278	338	
	Beerbhoom -	—	—	—	189	149	67	Village roads (b)	405	405	
	Midnapore -	111	—	111	150	365	47	Ditto (b) -	562	673	
	Hooghly and Howrah	34	—	34	128	232	31	84, besides 5 roads (a) and union town and village roads (b).	475	509	

CHAP. I. QN. 18.

STATEMENT showing the NUMBER of MILES of PROVINCIAL and DISTRICT ROADS of each kind in each DISTRICT of BENGAL—continued.

Civil Divisions of Commissioners.	Districts.	Number of Miles of Provincial Roads.		Total.	Number of Miles of District Roads.				Total.	Grand Total.	Remarks.
		Mettled.	Unmettled.		Mettled.	Bridged, but unmettled.	Not bridged and unmettled.	All other roads.			
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
Presidency	24 Pergunnahs - Nuddea -	91 12	— 15	91 27	196 136	157 583	86 171	Village roads (b) 102, besides village roads (b) 235	439 992	530 1,019	(a) Mileage not known. (b) Number and mileage not known.
	Jessore -	14	—	14	70	186	178	90, besides village roads (b)	669	683	
	Moorshedabad -	—	—	—	27	213	389		719	719	
Rajshahye	Dinagapore	—	—	—	—	248	—	—	248	248	
	Rajshahye	—	—	—	—	219	—	71	295	295	
	Rungpore -	—	—	—	—	1,133	—	—	1,133	1,133	
	Bogra -	—	—	—	—	129	117	78	324	324	
Cooch Behar	Pubna -	—	—	—	6	70	106	93, besides roads (a).	275	275	
	Darjeeling -	55	138	193	13	130	—	8 roads (a)	143	336	
Dacca	Julpigoree -	—	—	—	—	202	193	—	395	395	
	Dacca -	—	—	—	—	17	35	150	217	217	
Chittagong	Furcedpore -	—	—	—	—	107	120	44	271	271	
	Backergunge -	—	—	—	—	85	—	—	85	85	
	Mymensingh -	—	—	—	—	54	186	256	496	496	
	Tipperah -	—	52	52	—	112	94	Village roads (b) 308, besides village roads (b).	514	566	
Patna	Chittagong -	—	46	46	—	127	101	8	236	282	
	Nonkholly -	—	24	24	—	193	96	35	324	348	
	Hill tracts of Chittagong -	—	—	—	—	12	10	180	202	202	
Bhagalpore	Patna -	36	—	36	36	102	67	273	478	514	
	Gya -	124	27	151	97	71	402	135	705	856	
	Shahabad -	54	—	54	6	441	459	36	942	996	
	Mozufferpore -	—	—	—	—	543	—	104	647	647	
	Sarun -	—	—	—	—	185	275	129	589	589	
	Chumparun -	—	—	—	—	665	212	6	883	883	
Orissa	Monghyr -	—	—	—	38	131	76	45	290	290	
	Bhagalpore -	—	—	—	45	218	162	19 roads (a), besides village roads (b).	425	425	
	Purneah -	100	—	100	—	507	397	336	1,240	1,340	
	Malda -	—	—	—	—	137	45	178	360	360	
Chota Nagpore	Sonthal Pergunnahs -	—	—	—	184	161	78	10	433	433	
	Cuttack -	60	260	320	43	149	109	61 besides village roads (b).	362	682	
	Pooree -	1.4	—	114	—	69	14	Village roads (b)	83	197	
Jubbulpore	Balasore -	96	—	96	32	196	42	Ditto	270	366	
	Hazareebagh -	171	27	198	30	70	124	16	240	438	
	Lohardugga -	—	65	65	—	—	585	352, besides station and village roads (b).	937	1,002	
	Singbhoom -	—	—	—	—	—	—	544	544	544	
Total	Manbhoom -	112	26	138	—	528	—	—	528	666	
	Total -	1,391	684	2,075	1,994	8,230	6,331	—	20,198	22,273	

CENTRAL PROVINCES.

CENTRAL PROVINCES.

Mr. Nicholls.

In the following districts the ordinary means of conveyance is by wheeled carriage; and there is a sufficient number of carts for all ordinary wants:—

Nagpur.	Nimar.
Wardha.	Hoshangabad.
Bhandara.	Narsinghpur.
Seoni.	Saugor.
Chhindwara.*	

* Aided by the carts of other districts and pack-bullocks.

In Betul, Damoh, and Jubbulpore there appears to be a considerable deficiency, but in many parts of Damoh and Betul, perhaps also in Jubbulpore, carts cannot get about the country.

In Mandla and the uplands of Balaghat, carts are almost unknown. In the low lands of Balaghat, in the Wainganga valley, the country is very well supplied with carts.

Chanda shows a very great number of carts, but it is believed that these are mostly in the country on the

west of the Wainganga. The east of the district is very wild, and the roads were such that the length of a journey would, not long ago, be described by the number of spare axes which would be sent with a cart to provide for breakages.

But carts for driving purposes and for the carriage of goods are extensively made, as may be gathered from the fact that the value of those sold at the Chanda fairs during 1865-66 amounted to Rs. 3,38,700. During the year 1877-78, for some weeks considerably over 36,000 carts paid toll every week on the eastern road in the Bhandara district. A considerable portion of these belonged to Nagpur and Kamptee, and still more to Chhattisgarh. But the wonderful activity in cart making in the Bhandara district, where last year it was very difficult to get a carpenter to look at any other sort of work, seems to prove that, even aided by Nagpur and Bhandara, there are not sufficient carts in Chhattisgarh to meet the requirements of its ordinary trade, and apparently the carts which belong to the districts are almost confined to the west of the district.

The trade from Chhattisgarh towards the south, the eastern coast, with Ranchi and Mirzapur and Jubbulpore, is carried on by pack-bullocks.

The east of Raipur and Bilaspur are similar to Sambalpur, for which the deputy commissioner has given me the following account:

"Mr. Russell, who has long been Settlement Officer here, writes 'that every village possesses 10 or 12 small carts with wooden axles and roughly made block wheels, not always quite round.' A smaller estimate of six to each village in the feudatory states gives the following numbers for the whole district:—

Khalsa and non-feudatory zemindaries for 1,710 villages	17,100
Feudatories 4,597 villages	27,582
	44,682

"Out of this large number there are perhaps not 50 which are used for exporting and importing goods. They are kept almost exclusively for agricultural purposes. The reason why they are used only to a limited extent is that the carts are very small and fragile,—the bullocks diminutive, and ill fed, and consequently weak. The average load of a cart is six maunds, and the length of journey per diem about eight or nine miles. The capabilities of the carts I have myself tested; for during the past marching season I employed some, and found that it took two to carry a single pole tent weighing 13½ maunds. As long as the marches did not exceed eight or nine miles they did fairly well, though they took longer in getting over the journey than buffaloes; but on my having to do 14 to 16 miles a day the bullocks on the second day broke down completely, and the only way in which I could prosecute the journey was by pressing fresh ones in the villages on the road. Taking every thing into consideration, I am of opinion that the wheeled carriage of this district is not sufficient for its ordinary wants, because it is not capable of being used with profit for carrying the export and import trade, and this opinion is fully borne out by the fact that ganjam and cuttack carts, together with pack-bullocks, are exclusively used for this purpose when goods are taken by road. Should

a famine occur such as would necessitate the importing from long distances of considerable quantities of food grain, it is my opinion that the wheeled carriage would be only useful in distributing grain brought to depôts by other means of conveyance, and that it would be useless to expect the carts to be available for the work of importation. The cost of carriage per ton per mile may be put down at 5½ annas."

Whatever may be our shortcomings in the way of carriage, what we have has been sufficient to block up all the railway stations in the provinces, the railways being quite unable in a time of pressure to remove it fast enough.

Question.—What is the ordinary cost per mile of conveying one ton of merchandise either by wheeled or by pack carriage?

Answer.—It was recently calculated that the cost on the Great Eastern road of the conveyance by carts was 2½ annas a ton per mile. Where grazing is abundant and time no object, it is believed that the rates for conveyance by pack-bullocks would be generally lower. There are also parts where only pack bullocks or buffaloes can be used.

The following rates have been supplied to me:—

	By carts.	By pack-bullock.
Sambalpur	5½ annas	—
Nimar	—	—
Chhindwara	4½ "	—
Narsinghpur	4 "	4½ *
Saugor	3½ "	—
Wardha	3 "	—
Bhandara	—	—
Balaghat	2½ "	—
Seoni	—	2½
Raipur	—	—
Nagpur	2 "	—

The difference of rates in the Jubbulpore district is very great. I give the reply furnished by the deputy commissioner for each tahsil:—

Tahsil Jubbulpore.—"The hire per maund per mile is 3 pic, hence the cost of conveying one ton of merchandise comes to 7 annas, either by wheeled or by pack carriage. Ordinarily a pack bullock or pony can carry 2 maunds, and a cart with 2 bullocks 8 maunds. The hire of a cart is 15 annas per diem, and that of a bullock, including the driver, is 6 annas a day; the cart or bullock can travel 12 miles a day.

Tahsil Sihora.—"One ton of merchandise can be conveyed at a cost of 5 annas and 6 pic by pack-bullocks, but would cost 4 annas a mile if conveyed by wheeled carriage. A pack-bullock can carry 2 maunds and 20 seers, and a cart drawn by 2 bullocks will hold 15 maunds. The daily hire for a cart is Rs. 1-8-0, and for a bullock 6 annas; carts and pack-bullocks can travel 15 miles a day.

Tahsil Murwara.—"The cost of conveying one ton of merchandise per mile is 2 annas 6 pic by cart, and 3 annas 6 pic by pack-bullocks; a cart can convey 14 maunds, and can travel 12 miles per diem; a pack-bullock can carry 2 maunds, and travel 12 miles. The hire of the former is 15 annas a day, and that of the latter is 3 annas."

* Buffaloes are mostly used instead of pack-bullocks in the Narsinghpur district.

Means of communication.—The means of communication in these provinces are, on the whole, at present unsatisfactory, but yet the province has many general advantages.

Connection of centres of trade.—The centres of the grain trade may be said to be, (1) Murwara, (2)

Jubbulpore, (3) Saugor, (4) Gadarpur, (5) Harda, (6) Khandwa, (7) Mandla, (8) Hinganghat, (9) Nagpur, (10) Kamptee, (11) Toomsar, (12) Dongergarh, (13) Raipur. Of these, 1, 2, 4, 5, 6, 8, and 9 have railway communication, 10, 11, 12, and 13 will be connected with a railway in about two or three years,

and 3 and 7 are connected with a railway by bridged and metalled roads.

Condition of roads.—The bridged and metalled roads are maintained in a condition to be open for traffic throughout the year. Others are difficult to traverse during the rains, but generally for $7\frac{1}{2}$ months in the year, or from the end of October to the middle of June, are available for traffic without much difficulty. Portions of the Great Indian Peninsular with East Indian and Holkar State Railways traverse the province, besides the Wardha Valley State Railway, making a total of about 530 miles of railway within the limits of the province. Of ordinary roads, this department now maintains about 900 miles of metalled and bridged roads, 120 raised, bridged, and unmetalled, and 250 neither raised nor bridged. Besides these, numerous district roads exist, some of which are raised and bridged. Water communication exists in the Upper Godavari district by means of the river Godavari, and I believe it also exists in Sambalpur district by the river Mahanadi.

In the black cotton soil districts the country may be said to be closed for wheel traffic during the monsoon, or for $4\frac{1}{2}$ months in the year; and in cases of distress from famine, the difficulties and cost of carriage of grain over such tracts would be enormous.

Ordinary means of conveyance.—Wherever roads are constructed and maintained, wheeled carriage at

once takes the place of the pack-animals. At present, a very large portion of the traffic is carried by means of the latter. Between the two; i.e., the wheeled carriage and pack-animals, there is an enormous quantity of carriage available.

Cost of carriage per mile per ton.—The cost of carriage by cart or pack-animals has risen of late years. The demand has been greater on account of the large development of the grain trade, and expenses are heavier. On the metalled roads, carts will carry about $\frac{3}{4}$ -ton, and travel from 10 to 15 miles a day. In the last trading season, the hire of a cart was Rs. 22-8-0 per mensem or 12 annas a day. This would bring up the cost (at 12 miles a day) to about 16 pies per ton per mile.

Pack-bullocks carry about $3\frac{1}{2}$ maunds or $\frac{1}{2}$ of a ton from 8 to 10 miles a day, over mere tracks. One man takes care of about 20 cattle. What their actual cost for feeding is I cannot say, but I understand that in some places now the malguzars (more alive to their own interests than formerly) charge grazing fees on cattle feeding on their estates. The cost of carriage, whether by wheeled conveyance or animals, is, I imagine, much the same, as far as expenses go, but less capital is required for carts, as in these two bullocks will draw $\frac{3}{4}$ -ton, whereas that quantity would require six pack-bullocks.

BERAR.

BERAR.

Ir. Dunlop.

A few years ago a scheme was sanctioned for supplying the province with a complete net-work of second-class roads, and this is now gradually being worked out.

The Amraoti and Akola districts are already well furnished with roads. In Basim, Wun, and Buldana some important lines are under construction.

The roads are not all completely bridged, but they are generally sufficiently so for the traffic that is on them. The rivers that are unbridged seldom remain in flood for any length of time, and during the rains a delay of a few hours is all the inconvenience that cartmen occasionally experience. In addition to second-class roads, third-class roads, viz., fair-weather tracks, are kept in repair.

The supply of carts is sufficient for the ordinary requirements of the province, but there is no surplus supply.

BOMBAY.

BOMBAY.

Colonel
Jenkin Jones.

The province is well supplied with metalled and moorum roads. In the central division the roads named are bridged and metalled:—

Poona via Sholapur as far as Tandulwarce, Nizam's frontier.

Poona via Ahmednagar to Toka.

Poona to the foot of Bhore ghaut towards Bombay.

Poona via Satara to the Kolhapur State, near the Warna river.

Barsee Road station via Barsi to Yedsi.

Kurrar to Chiploon by the Koombharlee ghaut.

Soorool on the Poona and Satara road, via Wace to Mahableshwur.

Nearly all the rivers on these roads are bridged, except the Warna, on the Satara and Kolhapur road, where a masonry bridge is being built; the Bhima river at Koregaum, on the Poona and Ahmednagar road; the Bhima and Secna rivers, on the Poona and Sholapur road. Flying bridges are, however, provided for these river crossings.

In the northern division the old Bombay and Agra road extends from the foot of the Thull ghaut to the frontier of Khandesh. There is a bridged and

The deputy commissioner of Amraoti could not recently find any one to contract for the supply of 150 carts for carriage to a regiment about to march from Ellichpur to Aurungabad. Traders, however, find no difficulty in getting their general requirements in this respect supplied. Many of them make carting contracts for the season.

A great improvement has taken place in late years in the style of cart in use, the old Berar cart, capable of carrying only 10 maunds, being gradually replaced by the Madras bandy, which carries 15 maunds.

In the Ellichpur district the cost of carrying one ton is said by the deputy commissioner to be three annas per mile, each cart carrying half a ton. In the Wun district it is said to be four annas a mile, and in the Amraoti district from four to six annas. In the Akola district it is six annas on the average, but the trade rate varies considerably at times.

metalled road from the Munmar railway station to Dhoolia, which, with the exception of the Girna river, is bridged and drained throughout.

As a general rule, all the rivers and nullas south of the Tapti are passable for traffic during the rains, except the Girna. Carts may be detained by floods, but the water soon runs off. The Girna is also passable at ordinary times during the rains, but for a fortnight or more can only be crossed by boats. From the beginning of the rains to the end of November the Tapti can only be crossed by boats.

Besides the above-mentioned roads there are many moorum roads more or less bridged and drained, besides fair-weather roads connecting the taluka stations of the different collectorates.

The roads are in good working order. The metalled roads are open throughout the year, and so also are the moorum roads, the large rivers still unbridged being crossed by flying bridges or ferry-boats.

The ordinary means of conveyance are chiefly wheeled carriages, but in parts of the Satara and Kandesh collectorates bordering on the Ghauts pack-bullocks are also employed.

There is a sufficient number of carts and bullocks. Conveyance per ton by wheeled carriage averages from two to five annas per mile, and by pack-bullock something more.

No new lines suggested.

From the main artery of communication from Poona south through Satara, Kolhapur, Belgaum, Dharwar, Hoober, and Hurrayhur, six first-class bridged, drained, and metalled roads communicate with ports on the western coast.

Of these six roads two between Poona and Kurrar have no connection with the southern division. The third is situated about 30 miles north of the Warna river, the northern boundary of the southern division. It connects the mail road with the busy port of Chiploon, and though outside the southern division a large portion of the trade of the division is conveyed over this route.

The next first-class road connects Belgaum, 118 miles south of Kurrar, with the port of Vingorla. The remaining two first-class roads connect the town of Hoober, 12 miles south of Dharwar, with the ports of Karwar and Coompta.

In addition to these first-class roads there are others, fair-weather roads only, not being completely bridged and drained or metalled, which connect the Deccan with the Konkan. These roads cross the Sahyadri range at the Phonda and Tini ghats. The Phonda ghat lies between Kolhapur and Belgaum, and is connected with the Poona mail road at Kolhapur and due east at Neevani. Of these two connecting lines that from Kolhapur to Phonda is a fair-weather road partially bridged and drained. The other road is a secondary fair-weather road, unbridged and undrained. The Phonda ghat is a good mountain road, metalled and completely drained, and from its foot four unmetalled roads communicate with the coast at Rajapur, Wagotun, Deoghur, and Malwan. That to Deoghur directly west is the only road bridged and drained. But this line is little used, the trade, as of old, going to Rajapur, the chief town in the Ratnagiri district, and to Malwan.

The Tini ghat is a pass on the mountains due west of Dharwar. This route passes into the Portuguese territory of Goa. The road is partially bridged and drained, and is unmetalled.

Another road of communication between the Deccan and the coast by the Amba ghat, which lies west of Kolhapur, is now under construction. The ghat road will be completed in 1879-80, and likewise the connecting roads to Kolhapur and Ratnagiri. This line will be completely bridged and drained, and will be open at all seasons to wheeled-carriage traffic.

The centres of trade, so far as the mail road connecting Kelhapur, Belgaum, and Dharwar with Poona, are thus in communication with ports on the coast, and cart traffic is not suspended during the south-west monsoon by the (1) Chiploon and Karar; (2) Vingorla and Belgaum; (3) Karwar and Dharwar; (4) Coompta and Hubli roads by reason of the inefficiency of the roads themselves. All these roads are open to traffic at all seasons of the year; but as the ports are virtually closed during the south-west monsoon, there is little cart traffic between July and September. Karwar is a small port, and gives little shelter during the south-west monsoon; but there is very little trade there at that season, as native craft do not ply, and ships, excepting those of the British India line, on their way to and from Calcutta, are very shy of venturing near the western ports on a lee shore.

When the Amba ghat road is completed, and a connection is made with Meria Bay at Ratnagiri, a small amount of shelter may be obtained at that port during the south-west monsoon. Practically the western coast is closed at this season; and if it had safe harbours, trade would be very slack on account of the very heavy rainfall in the Konkan and on the Sahyadri range. Twelve feet of rain in the Konkan, and 16 to 20 feet on the mountain, between the 1st of June and 1st of November, is an ordinary rainfall

in those parts, and few articles of trade could encounter such wet weather and dampness without deterioration.

During the famine of 1877 cart traffic traversed the roads mentioned the whole of the wet season. The famine was the cause of immense quantities of grain being shipped during the open season to Compta, Karwar, Vingorla, and Chiploon, which were not conveyed up country before the wet season set in. The coast traders accordingly had their grain carted during the wet season; and as vast numbers of the cattle of the Deccan had died, this traffic was continued with human draught to the bullock-carts. The carts drawn by men were very destructive to the roads, for, as in the ordinary way seven bags of grain make the load for a pair of bullocks (about half a ton), the traders paid the cartmen by the trip for the loads; thus in their eagerness for a good return for their labour, the cartmen used to carry double loads.

Kaira.—Mr. Porteous says: Nariad, Dakor, and Wassad, three of the principal centres of trade, are all on the railway; and Kapadwanj, another trading centre, is connected by a good road with Dakor.

The country to the west of the B. B. and C. I. Railway is not, in my opinion, sufficiently provided with roads. The very rich taluk of Borsad has only one road, that connecting it with Wassad railway station.

Those roads which do exist are open throughout the year, and they are sufficient for the traffic which at present uses them.

In the open season there are numberless cart tracks; every village almost has its cart track to neighbouring villages or to the nearest roads, but these tracks are closed to all wheeled traffic in the monsoon. It is of importance to recollect this in connection with the condition of the country to the west of the railway. There is a very dense population in Borsad, and for at least three months in the year the whole of it, except the considerable fraction inhabiting the taluka town itself, and three or four villages on the road thence to Wassad, can import or export nothing except on pack-bullocks. I saw a great deal of the taluk in May and June of this hot weather, and I am convinced that if famine ever threatens this district, one of the first things to think of will be the best means of making the Borsad taluk less inaccessible in the monsoon. Unfortunately the taluk is so interlaced with foreign territory (Baroda and Cambay) that unless these states co-operate, Government would have to provide Baroda and Cambay ryots with roads by the very act of providing them for our own people.

Thana.—The three lines of railroad and the Agra road, and the road from Poona to Panwell, afford the chief means of internal communication. There are but few other roads in the district, and they may be said to be confined to the Salsette and Panwell talukas; short roads, constructed from local funds. The centres of trade are Bhiwandi and Kalyan. Both are easy of communication with Bombay and Thana by water, and a good metalled road runs between Bhiwandi and Thana, and Bhiwandi and Kalyan. The former is the Agra road, which is cut in two by the unbridged Thana creek. The latter runs to the Kalyan creek, on the farther bank of which the town of Kalyan is built. The creek is unbridged. Road communication along the coast is quite wanting, and in the interior it is confined to rough cart tracks, constantly intersected by streams and rivers. A moorum road (unbridged) is now being made between Kalyan and the Malsej ghat, leading into the Poona district. Between the principal stations on the B. B. and C. I. Railway and the larger villages on the coast there are generally railway feeders constructed from local funds, but the whole interior part of the district is destitute of roads, except common cart tracks, which are made passable for the fair season, where serious difficulties are found, by such expenditure annually as the local funds can afford. The ordinary charge to traders for carriage by cart and by pack-bullocks

CHAP. I. QN. 1

BOMBAY.

Colonel

Jenkin Jones

Major-General

Wilkins.

CHAP. I. QN. 18.

BOMBAY.

Major-General
Wilkins.

is as follows: from 12 annas to 1 rupee per cart per day; from 4 to 8 annas per day per pack-bullock.

Khandesh.—Khandesh, as compared with other provinces, is certainly well off as regards means of communication. The G. I. P. Railway passes through the district from south-west to north-east for about 135 miles.

Bridged and metalled roads have been constructed from many of the railway stations to the nearest centres of trade. A list of metalled roads is appended:—

Bombay-Agra road (74 miles), passing through the Dhulia, Virdel, and Shirpur talukas.

Dhulia-Chalisgaon road (34 miles), leading to the first railway station in Khandesh, viz. Chalisgaon. Dhulia-Surat road (about 24 miles finished, the rest in fair order), passing through the Dhulia and Pimpalner taluks.

Dhulia-Erandol and Mhasawad railway station road (45 miles), passing through the Dhulia, Amalner, and Erandol taluks.

Jalgaon-Neri road (20 miles), passing through the Jamner and Nasirabad talukas.

Songir-Nandurbar road (24 miles completed), passing through the Dhulia, Virdel, and Nandurbar taluks.

Bhadgaon-Pachora road (9 miles), connecting the town of Bhadgaon with the Pachora railway station.

Sauda-Gata road (3 miles), railway feeder.

Erandol-Dharangaon road (6 miles), connecting the towns of Erandol and Dharangaon.

Parola-Kajgaon road (24 miles), leading to the railway station of Kajgaon.

Many important centres of trade, though not all, are connected by means of the above roads. Annually, some new lines of communication are taken in hand as funds permit, and it is hoped that under the new five years' budget system recently introduced by Government all important communications will eventually be provided for.

The roads are sufficient; in fact, in the fair weather, traffic rather avoids the made roads, in order to escape paying tolls.

Ahmednagar.—Considering the size and importance of the district, it must be said that road communication is very defective, but a decided improvement has taken place within the last two years. There is only one bridged and metalled road, namely, that to Poona, which is by no means of the highest commercial importance. The roads connecting the principal towns and marts with Nagar itself are good enough for fair weather, but they are mostly impassable in the rains.

Kaladgi.—The means of communication in the district are about as bad as they can be. There are two main roads leading into the district—one from Sholapur to Hubli in the Dharwar district, going right through the district from north to south; the other from the coast and Belgaum to Bagulkot, the chief town in the district, and then extending on to Hungund, another town. This last road intersects the district south of the Krishna, and runs from west to east. On these two roads the principal export and import traffic goes on. They are provincial roads; but only so in name. The first (the most important one, as leading to the railway) has not a bridge, drain, or culvert on its whole length; the last has a few drains and culverts. Neither of them is much better than country cart tracks, and as soon as the heavy monsoon rains set in they become absolutely impassable for wheeled traffic, so that the district becomes quite isolated. There are a fair number of local fund roads in the district, many of which are in better order than the provincial ones; but they do not lead out of the district, which is the great want. As far as I can judge, literally nothing has been spent out of provincial funds in this district in comparison to what has been spent in other places, whilst as a paying district it is one of the best.

There is not much traffic by pack-bullocks—individual petty traders keep a few, but there are no large herds kept by wanjars and lamas, as in some parts of India. Carts are the chief means of conveyance. There are sufficient of them. Cost per ton per mile $2\frac{2}{3}$ annas.

SINDH.

SINDH.

Col. Haig.

The province is well supplied with roads, which are for the most part bridged, but none are metalled. In North Sindh a rude description of cart is employed, but throughout the province generally the camel is the means of conveyance. Thus unmetalled roads suffice for existing needs of traffic, and they remain open throughout the year, except when floods occur, in

which case metalled roads would be equally useless. An increased employment of carts is greatly to be desired for the province, but a better kind of vehicle than that in use in North Sindh is also a desideratum. The ordinary cost of conveyance of goods is—

By cart—4 annas per ton per mile.

By camel—2 annas 8 pie per ton per mile.

MADRAS.

MADRAS.

The Board
of Revenue.

It may be said generally that the road communications of the presidency are satisfactory. Bridged and metalled roads do as a rule connect all the important centres of trade, and are in good working order and sufficient for the traffic on them, but it must be understood that the Board do not mean to say that there is not room for improvement by the addition of more bridges and more thorough metalling. There are also many fairly important trading localities which have only gravelled roads, and for which metalled roads would be highly desirable, as the facilities afforded by the gravelled roads would be severely strained by any unusual accession of traffic. As a rule, however, there is but little to complain of with regard to the roads in the Madras presidency. They are generally open to traffic all the year through, but in places where the bridging has not been completed, or where a bridge has been carried away and not yet replaced, there would probably be an interruption to traffic during heavy floods, but in the

case of an emergency arrangements would very soon be extemporised for overcoming a difficulty of this kind occurring between any important centres of trade. When roads pass over black cotton soil those that are not metalled are often impassable in very wet weather, but it is only in Bellary that the facilities for traffic are affected in this way to any great extent, and the important centres are reported to be connected by metalled roads. From Canara, where the rainfall is always over 120 inches, it is reported by the collector that the roads are closed to wheeled traffic during the rainy season for want of bridges over rivers or streams by which they are crossed, but with reference to this it must be borne in mind that, even if the roads were bridged throughout, there never would be any active traffic during the height of the south-west monsoon; and the district engineer, arguing from practical experience during the last monsoon, is of opinion that it can hardly be said that the roads are altogether closed

in the rains. It may be added that such a thing as a famine has never been known in Canara.

With reference to the Kistna district only is it reported that the roads are in a generally unsatisfactory state. The collector writes: "The means of communication by road are very indifferent. Bridged and metalled roads are the exception; existing roads are not in good working order, nor are they sufficient for the traffic. The non-metalled roads are virtually closed to wheeled traffic during the rains." As a set-off against this, it is to be borne in mind that there is canal or river communication between the chief centres of trade; that the rainy season, during which the roads are virtually closed, is of very limited duration; that the ordinary cost of carriage per ton by road is by no means high, viz., annas 3-6; that it has not been considered necessary to raise the local taxation for roads so high as in most other districts of the presidency, though the people could well afford it, and that the collector answers question 21 in the negative.

Except in the hill tracts of Ganjam and Vizagapatam and parts of the districts of Malabar and Canara skirting the western ghats, wheeled carriage is the rule throughout the presidency, but wherever there are hills there are pack-bullocks supplementing the wheeled traffic. Where wheeled traffic is the rule, sufficient carts are forthcoming for all the ordinary wants of the district.

The following table shows the number of miles of road in each district, and the average ordinary cost per mile of conveying one ton of merchandise. It will be observed that the rates are singularly high in Malabar, and singularly low in Salem. In Malabar, where money is abundant, everything is dear, but with regard to Salem the only explanation which occurs

to the Board is that there is a mistake in the collector's report, which states that a cart carries "1½ of a ton at an average rate of 1½ annas per mile." A cart-load is usually taken to be about half a ton.

District.	Area.	Miles of Road.	Cost of conveying one Ton.	
			Wheeled.	Pack.
	Sq. Miles.	Miles.	Rs. A. P.	Rs. A. P.
Ganjam (excluding the hill tracts)	2,598	820	0 2 4	—
Vizagapatam do.	5,303	632	0 2 0	—
Godavari	6,224	702	0 4 0	—
Kistna	8,036	774	0 3 6	0 3
Nellore	8,462	740	0 3 2	—
Cuddapah	8,367	879	0 4 0	0 8 0
Bellary	11,007	1,452	0 2 10	—
Kurnool	7,358	441	0 3 0	—
Chingleput	2,753	706	0 3 0	—
North Arcot	7,159	1,160	0 3 0	—
South Arcot	4,873	1,169	0 3 6	—
Tanjore	3,654	1,390	0 3 6	—
Trichinopoly	3,515	533	0 4 6	—
Madurai	9,502	993	0 3 2	—
Tinnevely	5,176	823	0 4 8	—
Coimbatore	7,432	1,364	0 2 4	—
Nilgiris	749	240	0 8 6	—
Salem	7,453	1,445	0 0 11	—
Canara	3,902	806	0 5 0	0 8 0
Malabar	6,002	1,617	0 7 6	1 4 1
Total	119,535	18,691	—	—

The areas given above exclude the hill tracts of the districts of Ganjam and Vizagapatam. With reference to the latter, the collector writes: "The rugged tracks used by the trains of pack-bullocks are being smoothed, causeways are being made across morasses, and wooden bridges over some of the minor streams. The country produces all that is needed for its sparse population." The same may be said of the other hill tracts.

MYSORE.

MYSORE.

Captain
Bowen, R.E.

The only means of intercommunication in the province are by roads—the Madras Railway traversing only the few taluks due east of Bangalore.

All the important centres of trade are connected by good bridged and metalled roads. The majority, however, of the cross or local roads are unmetalled, and but partially bridged. Nevertheless, they are practically closed to traffic but for very short periods during heavy rains. The local roads intersected by the Cauvery, Toonga, and Budra rivers are exceptions to this statement, these rivers during the monsoon being often impassable for days together. In the absence of bridges the establishment of a better description of ferry than that now in use is desirable at some of these points of intersection.

Along the northern, eastern, and southern frontiers the roads connecting the Mysore province with Her Majesty's territories are sufficient to meet all ordinary requirements. The outlet to the Wynad at the south-eastern corner of the Mysore district is, however, impassable during the rains; and as the coffee plantations of the Wynad draw the whole of their labour from Mysore, as well as the grain to feed that labour, the improvement of this, the Mysore-Manantoddy road, is of importance. At the same time it must be added that the Wynad has good communication with the Gundulpet taluk by an excellent bridged road recently completed. Communication with the Canara district on the west is impeded to a serious extent during the monsoon by the imperfect condition of the Manjarabad, Bhoond, and Agumbi ghats, the first two of which are now being gradually improved. The necessity for perfecting, as far as possible, these inlets from the west and for improving the communication between the heads of the ghats was well illustrated during the July rains of 1877, when

the price of grain at Suklespur and Mudgherri was greatly enhanced by the failure on the part of some traders to get their grain-carts up the ghats. The ascent of the Bhoond ghat or Munjarebad ghat is seldom or never attempted during the heavy bursts of the monsoon, but on this occasion the extraordinary high prices prevailing apparently induced a few enterprising merchants to make the attempt. At this time in South Canara rice was selling at 12½ seers the rupee; at Suklespur, Wastarn, Aldur, Mudgherri, it averaged 3½ seers the rupee. The mere fact of bridging and improving the road connecting Chikmagalur with the head of the Bhoond ghat has effected a very sensible reduction in the cost of conveying coffee from the Kadur plantation to the coast. To make perfect the roads over and along the ghats would sensibly affect the cost of food in the west in time of famine, and the importance of this object is materially increased by the large numbers of coolies who now gain their livelihood in the rapidly-developing coffee plantations of Koppa, Kadur, and Manjarabad.

The extensive triangular tract of country bounded by the Tarrikere-Chittledrug, Shemoga-Hiriyur, and Chittledrug-Harihar roads is badly off in the matter of roads, the line traversing it from Benikpur via Chennagiri, Dumi, and Holakere being very imperfect. It may, however, be remarked that this part of the country is but sparsely populated.

The ordinary means of conveyance in the country is by bullock-carts, of which there is a sufficient number for its wants. A good deal of the grain coming up

* I am doubtful about this, and cannot find my notes on the matter.

CHAP. I. QN. 18. the western ghats and much of that passing from village to village in the Mulnaad, is carried by pack-bullocks, a small fraction by donkeys.

MYSORE.
The ordinary cost of carriage is in the Public Works Department $1\frac{1}{2}$ annas per mile per 1,000 lb.; but during the year 1877 the rate was raised to

2 annas per mile, which was about the rate then prevailing for carts employed in the grain traffic. In ordinary years, however, the cost of conveyance of grain is, I should say, not more than 1 anna per mile per 1,000 lb.

RAJPUTANA.

RAJPUTANA.

Capt. Barr. Jodhpur, Jesalmir, Captain Barr.—There is only one metalled road in the province; it is 100 miles in length, and passes through the south-eastern portion of Marwar, from the rail at Beawar, to the boundary of Marwar and Sirohi, about 40 miles from the foot of Mount Aboo. The country being generally flat and easy to traverse, roads connecting villages are plentiful and easy for carts, camels, and bullocks. In seasons of scarcity of food grains, Brinjarra bullocks carry a great deal. In ordinary years, carts are generally used in the more cultivated districts, while camels and bullocks are employed more generally in the northern and north-eastern parts, where the country is chiefly a sandy desert. The ordinary rates of carriage are: wheeled carriage 5 annas per ton per mile in dry weather, $6\frac{1}{2}$ annas per ton per mile in hot weather; packed carriage, 8 annas per ton per mile.

Jaipur, Colonel Benyon.—There are 265 miles of good metalled road in the state. One parallel to the Rajpootana State Railway (constructed previous to the railway) 127 miles long, and two good metalled roads perpendicular to the line of railway as feeders to it—one from Mandoar to the Kerrowli border, one from Jeypore to Tonk, the adjoining state to the south.

When the famine in 1868 occurred in Rajpootana, the road mentioned above as parallel to the railway was of the greatest use in facilitating the transport of grain from Agra to Ajmere.

Dr. Moore.—Means of communication are very backward. The first-made road in the province was through the Burtpore state—a work initiated when the chief was a minor, and the administration in the hands

of a British officer. This was about 15 years ago. Shortly afterwards, the Jeypore Maharajah was induced to continue this road through his territory, as far as the city of Jeypore, and this road was completed, excepting one or two bridges, some eight or nine years back. Then a road was made from Ajmere to Beaur, in British territory, and more recently from Jeypore to Ajmere, partly through Jeypore and partly through British districts. As usually happens, some good results even from epidemics and famines. The famine of 1868-69 painfully showed the great necessity of better means of communication and the works instituted under the guidance of Colonel Keatinge took the form of road making. The most important road made was through the Burr pass, which, although the central road of the province and the route from Bombay and Guzerat to the north-west, was nevertheless in exactly the same condition as it probably was a thousand years previously,—scarcely passable for a wheeled vehicle. Afterwards the road was carried on through Marwar and Sirohi to the foot of Aboo. The continuation of this road via Deesa, Sidphoor, and Mysanna to Ahmedabad is still in a most disgraceful condition, being simply a track through the sand, not drivable over. Another famine road was from Ajmere, or rather Nusserabad, to the military station of Deoli, and some attempt at a road was also made from Deoli to Tonk, and between Jeypore and Tonk. None of these roads are, however, fully bridged. There are one or two rivers on all of them, which, for a few days every year, always stop traffic.

CENTRAL INDIA.

CENTRAL INDIA.

Lt.-Col. Bannerman.
Mir Shahamat Ali.

Lieutenant-Colonel Bannerman, Bhopal.—A metalled and bridged road to G. I. P. Station at Etarsee. Carts are used in dry season, and at other times pack-bullocks.

Baghelkhand.—A large portion of Baghelkhand is full of jungles and hills, and is very backward in the way of internal communications. The several market places are connected by common country paths almost impassable during the rains. North of the Kaimurs there is the magnificent Deccan road, from Mirzapore to Jabalpur, which for 150 miles runs through this agency, and passes through Rewah and Maihar. (2) Branching from it is a road from Rewah to Allahabad via Sohagee pass. (3) The Sutna Bella road, bridged and metalled throughout, which leaves the Deccan road nine miles from Rewah, and strikes the railway at Sutna. (4) The imperial road from Sutna to Nowgong, in the heart of Bundelkhand, almost completely bridged and metalled, and runs through the states of Nagode and Sohawal.

These 1, 3, 4 are open all through the year, and the only bad part of 2 is in Rewah territory.

On these lines traffic is by carts, of which there is a limited number, on all other by pack-bullocks generally.

On the pukka roads the cost per mile for conveying one ton of merchandise is 3 annas 7 pies, or say 4 annas; in the wilder parts of the country, by pack-bullocks, $4\frac{1}{2}$ annas."

Rutlam, Mir Shahamat Ali.—The means of communication are the common cart tracts, and not made roads, except the Mhow and Neemuch road, which alone is metalled and bridged. All other centres of trade are connected by cart tracks, which are only open for carts in the dry weather, and closed for wheeled traffic in the rains. The ordinary means of conveyance is mostly by wheeled carriage, and also by pack-bullocks, especially in the hilly tracts. There is a sufficient number of carts in the district for all its wants. The ordinary cost per mile of conveying one ton of merchandise, either by wheeled or by pack-bullock carriage, is 7 annas.

Western Malwa, Lieutenant-Colonel Martin.—The Holkar and Neemuch State Railways, completed to Rutlam and under construction to Neemuch, traverse almost the extreme west of the district from south to north. A branch connects Oojein with this line, and they bring the furthest corner of the district within less than 100 miles. A metalled road runs from Mhow to Neemuch, and the Agra and Bombay road, also metalled, traverses the district at the eastern extremity in a N.E. direction. A metalled road is under construction from Oojein to Agra, 43 miles in length. These are all the means of communication open or under construction, and capable of use throughout the year; and, as stated before, roads are the most useful works that can be undertaken.

CHAPTER I.—QUESTION 19.

CHAP. I. QN. 19.

To what extent are railways developed in your province? What districts are not traversed by them, and what distances have to be gone to reach the railways from the districts furthest from them? Are any districts so much isolated as to make it desirable to extend railways to them to facilitate the introduction of food in time of famine? Has the effect of the existing railways been to equalise prices and stimulate trade to any important extent? Give any facts that support this view.

PUNJAB.

PUNJAB.

Major Wace.

A railway traverses the submontane districts of the province, commencing with Gurgaon at its south-east end, and ending at Jhelum near its north-west end. This will shortly be completed to Rawalpindi, and perhaps to Attock, which stations are respectively 100 and 44 miles from the frontier city of Peshawar. Another line, branching off from the first at Lahore, runs in a south-westerly direction to Mooltan, and thence to Karrachi down the Indus valley. The first 30 miles of railway in the province, that between Lahore and Amritsar, was opened in March 1862; the line from Lahore to Mooltan was opened in April 1865; by October 1870 the Lahore and Amritsar line was extended to Ghaziabad, near Delhi, thus joining the terminus of the East Indian Railway, and placing the trade of the province for the first time in direct and unbroken railway communication with Calcutta and Bombay. The extension from Lahore to Jhelum was opened in 1876. The Indus Valley line, joining Mooltan with the Kotree and Kurrachee line in Sind, has only just been opened. The total railway mileage open in the Punjab now is:—

Name of Railway.	Miles.
Punjab Northern State Railway.	103
Sind, Punjab, and Delhi Railway	224
Indus Valley State Railway.	218
Rajputana State Railway	57
	55
Total	657

* The remaining line to Delhi, 124 miles, runs through the Saharanpur, Muzaffarnagar, and Meerut districts of the North-Western provinces.

† The remaining portion of the line is now open to Kotri, and thence by the Sind Punjab and Delhi Company's line to Karachi.

‡ This line will, when completed, connect Delhi with Baroda and Bombay.

Lines under Construction.—The only considerable line under construction is the extension of the Punjab Northern State Railway from Jhelum via Rawalpindi to the Indus river at Attock. The distance is about 120 miles. The portion to Rawalpindi will be opened, perhaps, 12 months hence; the probable date of completion of the remaining 56 miles cannot yet be stated. It is also in contemplation to construct a light narrow-gauge line from Lalla Musa, near Gujrat, to Miāni, on the Jhelum, a distance of about 50 miles. Miāni is opposite the salt mines of Pind Dadan Khan; and the salt traffic on the line would of itself yield a handsome return. The country which the line would pass over is perfectly flat, and the material lately used on the narrow-gauge line between Lahore and Jhelum being utilised for this line, the cost of construction will be very small.

Districts not traversed by Railways.—Assuming that the line of railway which already extends from Delhi to Jhelum will shortly be completed to the Indus, of which there is practically no doubt, and

that a district of which the major portion lies within 50 miles of a railway is for all practical purposes served by it, the only districts to which we need direct our attention are—

(1.) Gurdaspur and Kangra, lying north of the railway system;

(2.) The Hissar division line south of it; and

(3.) The Jhang district and Derajat division, which may be roughly described as the country south of the Salt Range and west of the Chenab.

To take each of these tracts in turn—

(1.) From the Amritsar station to Pathankot at the northern end of the Gurdaspur district is 72 miles, and the road is metalled. From Jullundur to Kangra is a distance of 88 miles; the road is not metalled, but is otherwise an excellent one. It is not unlikely that a light railroad may be constructed joining Amritsar with Pathankot; but the matter is not urgent.

(2.) From Delhi to Hissar is 104 miles, and from Delhi to Sirsa is 157 miles. Thence via Fazilka to Montgomery, on the Mooltan line, is 158 miles. The road from Delhi to Sirsa is partly metalled.

(3.) This tract may be considered as having Miānwāli and Bannu (Edwardesabad) as the points most removed from the railway system, with Jhelum and Mooltan as the nearest convenient points on the railway. These several points are connected by excellent unmetalled roads; they are not bridged, but as the entire carriage of the country is camel carriage, and the rainfall very small, bridges are little needed. The distance by road from Miānwāli to Mooltan is 194 miles, and to Jhelum 115 miles. That from Bannu down the west bank of the Indus to Mithankot is 307 miles. Mithankot is on the Indus just below its confluence with the Chenab, and is some 25 miles from the Indus Valley Railway.

No districts are so much isolated as to make it desirable to extend railways to them to facilitate the introduction of food in time of famine. The only part of the province concerning which any discussion can arise is the tract numbered 3 above, the country west of the Chenab and south of the Salt Range. The population and irrigation in this tract are:—

District.	Population, Souls.	Per cent. of Area cultivated, which is—	
		Irrigated.	Sailab, i.e., protected by River Floods.
Bannu	287,547	15	13
Dera Ismail Khan	304,846	32	35
Dera Ghazi Khan	308,840	57	10
Jhang	348,027	69	30
Total	1,339,260	—	—

Taking into account the extent of irrigation and sailab cultivation, the large amount of camel carriage existing in this tract (see reply to question 3), the great facilities for river carriage on the Indus and

CHAP.I.QN.19. Jhelum, and the fact that no severe distress occurred in this tract during 1860-61 and 1868-69, there would appear to be no urgent reasons of famine protection for extending railways to it.

PUNJAB.
Major Wace.

The opening of railways in the province has certainly both equalised prices and stimulated trade. As instances of the stimulation of trade by the railways, we have the large exports of grain during the Bengal famine, and again during the late Madras famine, and to Bombay for the trade with Europe. During the Bengal famine, between the 15th November 1873 and 31st March 1874, there left the province eastwards by railway—

	Maunds.
Wheat - - -	594,783
Barley - - -	647,375
Gram - - -	646,725
Jowar - - -	670,959
Rice, maize, and other grains and pulses - -	736,936
Total - - -	3,296,783

equal to 117,742½ tons. Subsequently, the net exports of food-grains (exports minus imports) across the east boundary of the province have been :—

	By native Land Carriage.	By Railway.	Total.
1874-75 - - -	876,079	2,840,548	3,716,627
1876-77 - - -	293,611	420,021	126,410
1877-78 - - -	688,408	6,835,709	7,524,117

AVERAGE PRICE OF WHEAT in the PUNJAB during the 4 YEARS 1873 to 1876, stated in SERS of 80 TOLAHS each per RUPEE.

At some of the Principal Marts of Districts south of the Sind, Punjab, and Delhi Railway.				At the Principal Marts on the Sind, Punjab, and Delhi Railway between Delhi and Mooltan.				At some of the Principal Marts of Districts north of the Sind, Punjab, and Delhi Line of Railway.			
—	Sers per Rupee.		Distance from Sind, Punjab, and Delhi Railway in Miles.	—	Sers per Rupee.		—	Sers per Rupee.		Distance from Sind, Punjab, and Delhi Railway in Miles.	
	Wheat.	Bájra.			Wheat.	Bájra.		Wheat.	Bájra.		
Karnál -	23	23	47	Delhi - -	21½	25	Gurdáspur -	25	20	42	
Hissar -	21	29½	104	Ludhiána -	24½	27½	Siálkot - -	22	25	87	
Ferozepore -	25½	33	51	Amritsar - -	23	26	Jhelum - -	25	30½	103	
D. G. Khan -	21	29½	33	Mooltan -	19	23	Rawalpindi -	25	33	170	
							D. I. Khan -	29	40½	138	
							Jhang - -	23½	27	60	

NORTH-WESTERN PROVINCES AND OUDH.

NORTH-WESTERN PROVINCES AND OUDH.
Mr. Buck.

An ordinary railway map will show more clearly than any verbal description the extent to which railway communication has been developed in these provinces. The East India Railway traverses them from their south-east corner as far as Delhi, sending off at Allahabad a branch to Jabalpur, which, meeting there the Great Indian Peninsula line, places these provinces in direct connection with Bombay as well as Calcutta. The Oudh and Rohilkhand Railway joins the East Indian Railway at Benares on the east, and, running in a curve through Oudh and Rohilkhand,

These are broad instances of extensive movements of grain to meet trade demands at a distance, which would certainly have been impossible, except in a much smaller degree, but for the railways. Similarly, in the reply to question 20, it will be seen that the trade which the Ravi used to carry has been transferred to the Lahore and Mooltan Railway, and that the extension of the line to Sind is likely to have a similar effect on the Sutlej trade.

It is not so easy to give facts showing how the railways have operated to equalise prices, because prices in every district depend on many influences, of which that of the railways is only one. But no one who has watched the operations of trade in the Punjab towns will have any doubt of the fact. The grain dealers receive immediate advice of the fluctuations of prices in the large marts with which they usually trade; advice conveyed as frequently by telegraph as by the post, and no chance of a successful transaction is missed by them. These are not the sort of men to be ignorant of the relative cost of road, river, and railway carriage,* nor of the fact that the railway is not only the cheapest, but also by very much the most expeditious, of the three.

The following statement, if examined, will show some of the difficulty that there is in tracing by existing prices the influence of the railways. The prices of districts off the railways follow very closely those of towns on the railway. And it is by the provincial exports and imports rather than by bare prices of adjacent districts that the influence of the railways is most easily traced.

* See the last paragraph of my replies to questions 18 and 20.

Railway, at Benares, where its terminus is separated from the East Indian Railway by the river Ganges, as yet unbridged, though the construction of a bridge is under contemplation. The provinces are therefore traversed by two parallel broad-gauge systems, the East Indian Railway, and Scinde, Panjáb, and Delhi Railway, on one side of the Ganges, and the Oudh and Rohilkhand Railway on the other. But the latter is subordinate to the former, with respect to which it performs at the same time the functions of feeder and competitor. Out of 47 districts in the North-Western provinces and Oudh, 24 are brought into contact with one or other of the railways.

The East Indian and Scinde, Panjáb, and Delhi Railways, in their course up the provinces, either pass through most of the chief trading centres of the Doab or are connected with them by short branch lines (as is the case at Benares, Agra, and Delhi). An important exception is the town of Farukhabad, which is left at a distance by the bend to the south which the East Indian Railway makes in its approach to Agra. Out of 35 districts in the North-Western provinces 15 are traversed for some portion of their length by the above railways.

The second system has placed all the chief towns in Oudh and Rohilkhand in connection with the East Indian Railway, and passes through nine out of 16 districts included in these two tracts.

In addition to these broad-gauge lines there is a short narrow-gauge line connecting the towns of Muttra and Hathras, which represents the first experiment made in these provinces of the construction by Government of light railways as feeders to the main lines. The profits are four per cent., and as far as regards local traffic the only trade now carried on has probably reached a maximum, but it will be seen from the map that it is proposed by Government to extend this line from Muttra to Achnera, and thus effect a junction with the light railway which runs from Agra to Rajputana, an extension which will attract to this line much of the traffic which now runs between these provinces and Rajputana via Agra, and may add to the receipts.

It is now proposed to commence a system under which, each year, a certain sum will be laid out in light-railway construction; and those lines, the direction of which has been more or less definitely determined, are marked on the appended map. The question of the comparative cheapness of roads and railways has formed the subject of much discussion. Sir J. Strachey, when Lieutenant-Governor, was much in favour of the construction of a network of light railways throughout the provinces, which, while adding to the receipts of the main lines by feeding them with traffic, would develop the resources of the tracts through which they passed, and would gradually relieve Government of the expense of maintaining a great number of metalled roads. The advantages of a railway over a road, apart from military or political considerations, may be considered proved if only sufficient traffic will take the railway to make it pay the bare interest on the money expended in its construction. In order to secure this object as far as possible, these light-railways should follow the present lines in which the trade of the country runs, and should be thus provided with the minimum amount of traffic which will make them pecuniarily successful. It is in determining the direction and extent of traffic streams that the collection of trade statistics are most useful.

Speaking generally, the trade of these provinces may be said to run in two streams lengthways and four streams crossways.

The two former are—
(I.) Along the Ganges-Jumna Doab belt through Benares and Lower Bengal and Calcutta.

(II.) Along the penultimate belt to Patna and Calcutta.

These two lines meet at Patna, below which they form one stream connecting these provinces with the port of Calcutta.

The four streams which run across or into these two main streams, are—

(I.) From Rohilkhand and West Oudh to the Doab. This stream may be subdivided according as it merely acts as a feeder to the main trunk line of the Doab, or as it actually crosses it on its way to the Panjab or Rajputana. So much as is a feeding stream divides, one portion passing up into the Upper Panjáb by the Sindh, Panjáb, and Delhi Railway, the other passing down towards Bengal by the East Indian Railway. The cross streams converge at Delhi for the Panjáb, and at Agra for Rajputana.

(II.) From Bundelkhand to the Doab. This stream may be considered merely a feeder to the East Indian Railway, which it meets at Cawnpore.

(III.) From the easterly districts of Oudh and the Benares division districts, which are south of the Gogra, to the East Indian Railway, which it meets at Allahabad, Gházipur, &c., and other places. This stream is merely a feeder to the East Indian Railway.

(IV.) From the districts of Oudh and the Benares divisions, which are north of the Gogra, towards the Gogra.

In great part this stream merely feeds the Gogra, but a portion comes over to the East Indian Railway, which it meets with at Benares or Gházipur.

To apply these remarks to the railway communication which at present exists, Trunk line No. 1 is almost entirely provided for by the Sindh, Panjáb, and Delhi and East Indian Railways, and will be entirely provided for when the proposed line from Cawnpore to Farukhabad and Kásganj is completed.

Trunk line No. II. is partly served by the Oudh and Rohilkhand Railway, which has diverted a large portion of it via Benares. There is still, however, an enormous trade down the Gogra, amounting in 1877-78 to some 43½ lakhs of maunds (about 155,360 tons). What trade now follows this line is carried entirely by the Gogra, there being no good road or railway to compete with it. It has been to a great extent proved that in North India a railway can compete successfully with a river, and a line connecting Upper Oudh with Chapra running down the Gogra-Gandak Doab is likely to prove a financial success if the expense of bridge-making is not too great an obstacle.

Side stream (I.), so far as it is a feeder to the upper Panjáb, is carried by the Oudh and Rohilkhand Railway line to Aligarh for the eastern districts of Rohilkhand and the western districts of Oudh; for the eastern districts of Rohilkhand it travels by road. The proposed line from Bijnor to Saháranpur is to carry this latter.

So far as it is a feeder to trade going down country, it is efficiently carried by the Oudh and Rohilkhand Railway line from Moradabad to Aligarh, and from Lucknow to Cawnpore.

The cross streams to Delhi and Agra, which also are a portion of side stream (I.), are carried more or less completely by the Aligarh and Cawnpore lines of the Oudh and Rohilkhand Railway. The portion which runs to Delhi from the Bijnor district and the westerly portion of the Moradabad district, at present travels by road, and a line from Bijnor to Muzaffarnagar would be of great use in carrying it. The stream is an important one.

Side stream No. II. will be carried by the proposed line from Cawnpore to Mau Ránpur. At present it travels by road. There is a great doubt whether it would not be better to connect Bundelkhand with East Indian Railway line south of Allahabad, and divert the course of the trade from its present line to one more convenient for it.

Side stream No. III. will be carried by two lines, one through the Partabgarh district, the other through Gházipur and Azamgarh; both will meet the East Indian Railway, with which Gházipur is to be connected by a short line now almost completed.

Side stream No. IV. will be carried by the line from Bahraich to Gonda and Nawábganj, on the Gogra.

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Mr. Buck.

CHAP. I. QN. 19.

CENTRAL
PROVINCES.

Mr. Nicholls.

to Mhow, Indore, and Rutlam, to be continued to Neemuch.

From Bhosawal in Khandesh, near the borders of the Bombay presidency, a branch of the Great Indian Peninsula Railway, 243 miles in length, running through Berar, traverses the Wardha district in its greatest breadth, and terminates at Nagpur. Within these provinces its length is 67 miles.

From Wardha, a State railway, 45 miles in length, branches off, and, running through the celebrated cotton mart of Hinganghat, connects the coal-fields of Warora in the north-west of Chanda with the Great Indian Peninsula system of railways. The great iron and limestone field of Lohara is about 60 miles east of Warora. Chanda is distant 28 miles, below which navigable stretches of rivers commence. Lohara is in the North-eastern Chanda rice-field.

From Nagpur a State railway has been very recently commenced, and will run through the military station of Kamptee eastward through the Bhandara rice field to Kullianpur, the western portal of Chhattisgarh, distant 125 miles. In the province there are 550 miles of railway open and 59 stations.

The existing railways do not traverse the Saugor, Damoh, Mandla, Balaghat, Bhandara, Raipur, Bilaspur, Sambalpur, Seoni, Chhindwara, and Betul districts. The distances to be gone are shown in table overleaf.

Sambalpur is so isolated that, if expense be no object, if the chance of its being of use to prevent starvation, say three times in a century, be a sufficient ground for recommending a railway to Sambalpur, then I should point to this district.

The case of Chhattisgarh is different. Even in times when there has been an abundance of food, sufficient to allow of large exports, when grain has been procured for money at rates which some 170 miles westward would be considered high, but not very high, untold deaths from starvation have occurred; plenty lulled the people into fancied security, cheapness was the "lotus" which they eat; that cheapness has been their curse. I can remember the time when the sentiment of Sir Richard Temple, that he hoped to see cheapness driven from her last stronghold in Chhattisgarh, was ridiculed. Time has proved him right. So long as there was this land-locked home of cheapness, thrift, industry, enterprise, were works or virtues of supererogation. All but a few were miserably poor amid the plenty, dependent on the few exceptions for life itself, without resources or credit in a time of distress. The opening up of the country, however imperfectly, by the Great Eastern road, has permanently raised prices and called forth the latent energy of the people. The opening of the railway will give a stimulus, an impetus, of almost immeasurable force. When the railway was opened in the Nerbudda valley, the sudden rise of prices, till a general rise of wages followed, was felt by the people with no little severity; but it was just the sting of the mustard plaster, afterwards promoting the more healthy circulation of the sluggish stream of life.

The Chhattisgarh, "land of threshing floors," will, by means of this new railway, become connected with Nagpur. The question arises whether Jubbulpore and the countries in railway communication with Jubbulpore might not, with advantage, as a mutual protection against famine, be connected with the Chhattisgarh country. The lead via Nagpur and Bhosawal to Jubbulpore or to the portal of Chhattisgarh, as the case might be, would be very long. The nearest point of this new railway to Jubbulpore would be at or near Tirror, in Bhandara. North of this is the rich valley of the Upper Weinganga. A railway in this direction would have to cross the drainage of parts of Seoni or of Balaghat, but it would protect the Balaghat lowlands and tend to bring under cultivation large tracts in the highlands of Balaghat and Mandla. The distance by rail from Kallianpur to Jubbulpore would be reduced to something over 215 miles, of which 175 probably would be the length

of this connecting line. Without this connecting line the distance from Kallianpur to Jubbulpore by railway would be 748 miles. The distance from Raipur to Jubbulpore over the Bajadhar ghat and through Mandla is 203 miles. This connecting line would also shorten the railway-traffic distance of Jubbulpore from Nagpur by some 353 miles. But as to the cost and engineering difficulties of such a line I know nothing.

The district of Damoh is somewhat isolated, not by reason of great distance, but by physical causes; scarped hills with very few practical passes shut off its southern portion (which, however, is but very thinly inhabited) from Jubbulpore and Narsinghpur. One brinjara track leads to the railway at Chhindwara, a busy town and station in the Narsinghpur district, another to the Shahpura station, in Jubbulpore. The military road from Saugor to Jubbulpore, passing through the head-quarters of the district, traverses the Singrampur Kattanghi pass. Eastward from Damoh an indifferent road, saddled with transit duty in the independent state of Panna, meets the East India Railway at Murwara and Jokai. To the north it is shut in by the Vindachal hills, with but few brinjara tracts through Bundelkand. On the west it has access by one road to Saugor, by another via Garhakotah and Rehli to Bhopal and Malwa, and, more important still, to the railway in Narsinghpur. Otherwise it may be said to be land-locked. But its highest capabilities would probably not support a railway, or even a section of a railway; and its existing means of access to grain stores, if it could pay for its requirements, are probably sufficient.

The sub-division of Sironcha, lately the Upper Godavari district, is very isolated. It is small and self-reliant.

Question.—Has the effect of the existing railways been to equalise prices and stimulate trade to any important extent?

Certainly, the railways have in a marked manner tended to equalise prices, not only in the districts to which they have been extended, but to great distances around. Karbi, the dry fodder stalks of the jowari plant, have been sent from Nagpur so far as Akola, 158 miles distant, till it could only be sold in Akola at a loss. The dry mhowa flower, ordered for Bombay, has been collected from the jungles and accumulated at Nagpur, having been countermanded, owing to the levelling of the rates at Bombay and at Nagpur.

In support, I quote from a memorandum of the chief engineer, Central Provinces, on the Chhattisgarh Railway:—

"Perhaps some idea of the cost, wear and tear, and difficulty attendant on the transport of grain from Raipur to Nagpur may be formed from a perusal of the subjoined figures, taken from the price current of the last few years. I compare in each case the price at Raipur* with the prices one month later in the districts which draw their food supplies from Chhattisgarh.

"Table showing the number of seers of food grains sold for one rupee at—

	Raipur.	Nagpur.	Warha.
Rice in January and February 1865	12	7	5
Wheat in March and April 1866	13	9½	8½
Rice in January and February 1867	12	9	7
Wheat in March and April 1868	52	18	17
Rice in January and February 1869	9½	6	5
Wheat in March and April 1870	19	12½	13

"From these figures it may be deduced that food selling at 19 seers per rupee cannot be put down at Nagpur under nine seers a rupee. It is very different when food comes by railway. Last year, in the months of scarcity, a good deal of jowari (millet) was imported in Nagpur from Akola, a place on the Great Indian Peninsula Railway, 158 miles west of Nagpur. Consignments of grain were only two days

* From Raipur to Nagpur, 180 miles.

CHAP. I. QN. 19. loss, and expense and trouble, attending the transport of our cotton from the interior to Bombay are now legends of the past.

BERAR.

Mr. Dunlop.

"Few can be more sensible than I am of how much this great gain is due to the arrangements of the Great Indian Peninsula Railway Company; and at the end of this, another season, I would desire to bear testimony to the benefit that has resulted to the cotton trade of our provinces by the excellent arrangements of the traffic department,—a view in which your chamber will, I doubt not, heartily join."

Since I commenced this letter I have quite by chance come upon an extract from a report which was quoted some years ago by the late Governor of Bombay, Sir Bartle Frere, the Member of the Supreme Council in Calcutta, in a letter addressed to an officer in Central India, in which he urged the improvement of the means of communication between the cotton markets and the sea-ports. This extract (from the report of General Balfour, C. B.) so correctly describes the condition of the trade at a comparatively recent date, that I cannot resist the temptation of inserting it here. It will show those whose introduction to the cotton trade in the interior has been subsequent to the completion of the railway the very great change that has taken place during the last few years, and will help to remind us of the importance of perfecting the communications in the cotton districts, if we desire to ensure the stability of the trade.

General Balfour wrote:—

"Formerly the greater part of the cotton was taken 500 miles on bullocks to Mirzapur on the Ganges, and thence conveyed on boats, 450 miles, to Calcutta. Now, the greater part goes to Bombay,* still wholly on pack-oxen, the distance varying from 126 to 450 miles, according as the cotton is purchased at one mart or another. The hire of a bullock for the journey ranges from about Rs. 5 to 16, the chief cause of variation being the time of year: a load is about 250 lbs. But this is not by any means the whole cost of conveyance; the indirect expenses are much greater,—the cotton is eaten by the bullocks, stolen by the drivers, torn off by the jungles through which the road passes, and damaged by the dust and the weather, as well as by having to be loaded and unloaded every day, often in wet and mud.

"The Bombay Cotton Committee† of 1847 state their opinion, after careful calculation, that the whole charges of conveyance to Bombay from the mart of Khamgaon, only 216 miles distant, being the nearest of all, do not fall short of Rs. 33 a candy (784 lbs.), the original cost of which at the latter place is not more than Rs. 50: thus the cost of carriage to the port of shipment is 66 per cent. on the price of the

* Present cost of the conveyance of the Berar cotton to the port of shipment.

† I was a member of the Committee, and all our calculations were under the mark.

(Signed) H. E. B. FRERE.

BOMBAY.

The railways in the Bombay presidency are—

1. The Baroda line, which runs north along the coast, traversing the collectorates of Thana, Surat, Broach, and Ahmedabad successively. The continuation towards Ajmere will traverse the northern part of Ahmedabad, and the continuation to Patri and Wadhwan traverses the western part and gives access to Kattywar. A branch to Pali runs for 32 miles through the eastern part of Kaira. Few villages in Gujerat are 30 miles from the railway. The effect of the railway has been to stimulate trade. The weight of goods carried from the stations in Kaira in 1868 was 31,138 tons. Since the Pali branch was opened this has increased to 107,914 tons in 1877.
2. The Great Indian Peninsula, which runs eastward from Bombay and traverses the Thana

commodity. The usual selling price in Berar is under one anna ($1\frac{1}{2}d.$) a lb., as we learn from Royle, as well as from the paper just quoted and other authorities: the absolute cost of the conveyance from the producing country to Bombay is, therefore, fully $1d.$ a pound. And this, though it seems small, is in fact enormous on so low-priced an article; so that in the report of the Cotton Committee above referred to, the rise of even one half-penny a pound at Liverpool is spoken of as operating most beneficially on the Bombay market.

"And we cannot regard the formation of good roads as less important or less essential to the prosperity and advancement of the country than the extension of irrigation. The two species of improvement are intimately connected, and should go hand in hand. Without the means of transport and of interchange the most valuable products become a drug, and production is arrested; thus roads give value to produce, and large production gives a use and value to roads. No advantages can make up for the want of the means of transport; at the present time good wheat is selling in the Berar valley at Rs. $5\frac{1}{2}$ (11s.) the quarter, and the whole cost of freight and charges from the coast to London do not exceed 15s. a quarter; yet in the absence of good roads, and of all attempt to improve the noble Godavery for navigation, the cost of carriage from the place of production to the coast effectually keeps it out of the market. For at present the only means of exit for the produce of Berar is by carriage on pack-oxen, either to Bombay, a journey of 60 days, 400 miles to Mirzapur on the Ganges, and then 500 miles down that river to Calcutta; whereas if the Godavery river, the natural outlet of that country, were opened to navigation, the cotton and other valuable produce it yields would reach the sea-port of Coringa at its mouth in 70 hours. On the other hand, a ton of salt, which is sold at the Government stores on the coast for Rs. 27, costs Rs. 112 at Nagpur. We have already adverted (para. 433) to the enormous yearly loss in the carriage of the cotton of the same country to the sea-coast by land instead of by the river, and have noticed what large supplies of that article of the best quality for the English market would immediately flow out if the navigation were opened."

In comparison with the above, produce is now forwarded from Khamgaon to Bombay at the following rates, viz.:—

	Rs.	a.	p.
Cotton	36	6	8 per ton;
Grain	14	9	0 do.;

and it is freely despatched to wherever there is a demand for it.

Another fact that supports the above view is the extension that has taken place in cultivation. In 1869–70 the cultivated area was 5,361,375 acres, and in 1876–77 it was 6,413,561, showing an increase in seven years of 1,052,186 acres.

district, Nassick, and Kandesh by its north-east branch, and Thana, Poona, and Sholapur by its south-east. The chord line from Munmar to Dbond, joining these branches above the ghats, runs through part of Nissick, Ahmednagar, and Poona. Parts of Nassick are 90 miles from the line. It runs through the eastern talukas of Kandesh, and the western are from 84 to 108 miles from the line. A State railway to join Kandesh with Gujerat has been discussed, and will facilitate the transport of grain. The most remote part of Poona is 60 miles from the line, of Sholapur about 50. So far, the railway facilities in Bombay are fair, and no new line is urgent. But in the southern districts the case is different.

Major-General Wilkins.—There are no railways in the southern division. As far south as Belgaum the

nearest railway station is at Poona, 212 miles distant from Belgaum, 140 miles distant from Kolapur, 70 miles distant from Sattara.

The Dharwar district is nearer to Bellary than Poona; but the railway at Bellary does not serve Dharwar and Hubli, as more speedy communication between those towns and Bombay is to be obtained by sea, or by Poona.

Considering the importance in military, political, and commercial points of view of the head-quarter stations of Sattara, Kolhapur, Belgaum, and Dharwar, which are all garrisoned by troops, their communications, though good of the kind, by sea and by road, are far behind the spirit of the age. Here is the frontier district of Dharwar, a district having a large trade in cotton and seeds, no less than 272 miles from its central mart at Hupli to a railway. Bellary is 130 miles distant only, it is true; but the railway there goes in the wrong direction to serve the people and the trade.

Three railways are needed in the southern division—

1. A line to serve the Kaladgi collectorate from the G. I. P. Railway. This line up to the Krishna river would be sufficient at present.
2. A line from Karwar to Bellary.
3. A prolongation of the Dhond and Munmar line to serve Sattara, Kolhapur, Belgaum, and Dharwar.

Of the second and third lines, the third is the most important in a political and military point of view. The second may be considered to have a priority of importance in a commercial and famine aspect, as opening up railway communication with a new port.

Mr. Robertson.—The district of Sattara has no line of railway, but it has excellent roads in connection both with the railway at Poona and with the coast of Chiplun.

My experience during the late famine was, that in order to supply the districts of the southern divisions, especially Kaladgi, and to secure an ample supply of food in case of famine, a line of rail was absolutely required, extending from the G. I. P. Railway from some points in Sholapur on to Bijapur in Kaladgi, and thence on to Dharwar. Large supplies of grain

were in the monsoon sent with great difficulty in carts, by bullock loads, and even by head loads from Sholapur in this division to the Kaladgi district. Had there been a line of rail, much of the distress in that district could have been averted.

There is no doubt that the existing railways have tended to equalise prices, but till the late famine fell upon us this had not been the case.

Till then traders drew their supplies from the local markets, and import by rail was hardly dreamt of. When the famine caused traders to seek distant markets, they were amazed at the result. Since then traders have commenced to seek distant and cheaper markets. The result of the famine has been to teach the people the value of the railway, and thus the railways have now the effect of equalising prices and of stimulating trade in grain to a most important extent.

Mr. Dharwar.—Railways are much wanted in the district. The high price of cart hire raised the price of grain for some time during the famine to 7 lbs. per rupee. The hire of one cart from the coast, 100 miles, was Rs. 50 for some time (the ordinary hire in usual years being Rs. 10 to 20), and the carts never contained more than 10 bags of 168 lbs. each, and generally only eight. The railway fare of a bag would have been merely nominal compared with this cost of Rs. 5 or more per bag. Another effect would have been that, as the railway would have run daily, there would have been no time (as during last rains for a month or six weeks) while the import of grain was stopped, and so prices could never have risen as they did.

But it is clear that the first need is a line in the famine districts of 1876–77 to supply them with grain.

The following lines are among the works projected by the Government of Bombay as safeguards against famine—

1. From Carwar by Hubli and Gadag to the frontier (163 miles).
2. From Gadag by Bijapur to the Barsi Road station on the G. I. P. Railway (220 miles).
3. From Dhond on the G. I. P. Railway by Sattara, Kolhapur, and Belgaum, to Dharwar (255 miles).*

* See Correspondence of 1878; Copy provided.

SIND.

The following is the mileage of railway constructed in Sind:—

	Miles.
Sind, Punjab, and Delhi Railway, Sind section, Kurrachee to Kotri	106
Indus Valley State Railway, Sind section, Kotri to Sukkur, Rohri, and border of Bahawalpur territory	310
Total mileage	416

The above lines traverse a large portion of the Kurrachee collectorate and the entire Shikarpur collectorate. The Hyderabad collectorate, and the large but sparsely populated district of the Thar and Parkar, are not touched by the railway system.

MADRAS.

These questions have been fully gone into by the consulting engineer for railways, in the note sent by him to the Famine Commission, and the Board consider it unnecessary to go over the same ground. It will be sufficient to mention here that this presidency is well provided with railways, lines passing through 13 out of the 21 districts. Of the remaining eight, six have the advantage of a long seaboard, and of the two non-maritime and non-railway districts, Kurnool and the Nilgiris, Kurnool has a railway on its borders, and the Nilgiris is a small and mountainous tract of

country with a railway station within a few miles of the foot of the hills.

Though perhaps no district in this presidency, with its long seaboard, its tolerably good system of roads, railways, and canals, can be considered so isolated as to render extension of railways an absolute necessity, there are doubtless tracts where such extension would tend greatly to facilitate the import of food-grains in times of scarcity when the draught power of the country, which generally consists of bullocks, becomes weakened and inadequate to meet the requirements of

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exceptional traffic through long-continued drought. The consulting engineer has mentioned in his note most of the places to which railway extension would be feasible and of great service. The following opinions of collectors as to the requirements of their districts, as practically shown by the late famine, are here inserted, as they indicate the directions in which inquiries should be made in the event of a large system of railway extension being resolved upon. Without detailed inquiries, however, as to the financial and engineering considerations involved in each scheme, it is not possible for the Board to pronounce any useful opinion on the merits of each, and they will not therefore attempt it.

The collector of Kurnool considers that a light railway in the Cumbum valley, which is from 70 to 160 miles from the north-west line, might be laid with advantage.

The commissioner of the Nilgiris advocates the construction of a line from Mettapolliem to Ootacamund (alluded to also by the consulting engineer for railways) and its extension to South-East Wynad. He remarks, "The great want of this splendid plateau is a railway, which, in my opinion, would be found not only to pay, but to afford an immense impetus to European industry here. I consider that it should run to Coonoor, and thence up the Kaity valley to Ootacamund, thence via Neddivattum to Gudalur and South-East Wynad, and so on to such point as might be selected to connect it with the projected Mysore Railway system. The late scarcity of food supplies to the towns in this district might have been less, if not entirely averted, if there had been any expeditious mode of transit for grain, &c., such as a railway affords. The opening of the railway from Pothanore to Mettapolliem, at the foot of the Nilgiri district, a distance of 35 miles, has considerably improved the traffic up the Coonoor ghat."

The collector of Cuddapah considers that a good new railway would be from Gudiyatam, in the North Arcot district, right through the sub-division taluks of the district, to join the new line at Tadpatri; the want of such a line having been much felt during the late famine, when grain had to be carried at a great cost and little speed.

The collector of Madura states that the single line of railway existing in the district was found unequal to convey the required quantity of food, that a want of sufficient supply in the markets was often felt when prices rose, and that another line of railway from east to west, opening the seaboard on the east, and connecting Pulghat and Caimbatore on the west with Dindigul and Madura (recommended also by the consulting engineer for railways), would remedy the evil. He is, however, doubtful whether the project would pay.

The following suggestions have been made by other collectors, not with special reference to the introduction of food supplies in times of famine, but on general considerations of development of the resources of the country and giving a stimulus to traffic.

As regards railway extension in the Vizagapatam district, Mr. Goodrich writes:—

"In the interest of the Chhatisgarh division of the Central provinces, and generally for the good of the empire, the construction of a light railway from the eastern coast towards Raipur is extremely to be desired. Nature has provided a cleft in the range of the Eastern ghats, and no pass over those mountains has to be constructed. The elevation of the villages through which the line should run to Raipur, if that were selected as the terminus, would be as follows, taken at intervals along the line from south-east to north-west:—Vizianagram 150 feet, Parvatipur 350 feet, Rayaghada 450, Kotragarh 880, Ombadola 1,200, Arusurgar 1,000, Tel river 700, Titlagur 750, Bengamunda 776, Karrul 850, Kotingee 875, Kumnora 900, Tirbor 1,000, Sambarsingh 1,100, Naru 1,030, Jonk river 900, Boriagar 973, Belsore 925, Mahandi river to be crossed and so to Raipur,

whence a light railway is in course of construction to Nagpur.

"The vast quantities of wheat grown in the Chhatisgarh plain, and the still vaster quantities which may be grown, find their nearest port at Bimlipatam or a point north thereof. The climate of the plateau of the villages in the range which this route pierces produces abundance of oil-seeds in addition to all kinds of forest produce, and the whole tract forming the upper basin of the Mahanadi would use no other salt but that which the salines of Vizagapatam and Ganjam produce, and which now supply for the larger portion of the tract. I should prefer as the easier route a more northerly course, following the 83rd parallel of longitude up to the point where it crosses the Mahanadi, and traversing the Patna and Borasambar zemindaries, tracts of very fertile and level land; but if the Nagpur line is to stop short at Raipur, and not be carried on towards Sambalpur, I would follow the line indicated, via, the Jonk river to Raipur. The latter line passes country somewhat more rugged than the Patna zemindari, and in the latter limestone occurs, a fact of the first importance; the plateau west of the eastern ghats is extremely poor in lime.

"The construction of a light rail or tramway would, in the opinion of those who have examined the subject, be certainly remunerative, and it appears commercially undesirable to attract the traffic of Raipur and the tracts east thereof to the port of Bombay, whilst the communications with the ports on the eastern coast (possessing so admirable a natural route, and situated at one-third of the distance from the centre of the tract) remain in a state of nature. The great respective advantage to the salt revenue is sufficient to constitute a strong argument for the grant of a guarantee, or for the construction of the line as a State line."

The collector of Nellore states that a railway from Nellore to Tripatty would be a great boon to the district. The collector of Godavari considers that a railway from Bezvada and Hyderabad would similarly greatly benefit that district.

The collector of Kistna remarks:—

"There is no railway nearer than Hyderabad on the one side and Madras on the other. The nearest point of contact is Hyderabad, 210 miles from Masulipatam, the chief town of the district, and about 110 miles from Jaggayyapet, one of the trading centres. A glance at the map of India will show the importance of continuing the railway from Hyderabad to this district. The line presents no engineering difficulties, and is crossed only by two streams of any importance, the Muniyer and the Paler. A railway from here to Hyderabad would have been of incalculable use during the recent period of distress, as supplies would have been passed into the distressed districts from this and the Godavari district by rail via Hyderabad, instead of taking the circuitous sea route to Madras, and thence by rail. Such a railway would, besides, be of great political and commercial importance at all times. It would greatly facilitate traffic, would stimulate trade, and should financially be a success. The sales of Government salt would be increased to the extent of not less than four or five lakhs annually."

The collector of Tanjore mentions a proposal to run a line from Nidamangalam on the South Indian line to Adirampatam on the southern coast of the district, and there is also under consideration a project for running a line from Mayaveram to Tranquebar, his Grace the Duke of Buckingham having approved it as a suitable project for a famine work, if such had been necessary. It is expected that the money required for these undertakings will, in all probability, be subscribed by the people of the district.

Regarding South Canara, Mr. Comyn says:—

"To connect Mysore and Coorg with the western coast by means of a railway from Bangalore to Mangalore via Mercara would be an inestimable boon no less to those provinces than to Canara; but, judg-

ing from the climate, position, past history of Canara, the occurrence of a local famine seems to be a contingency of such extreme remoteness as to make it unnecessary for the purpose of supply of food to extend railway communication to this district, were indeed such a project financially possible. At the same time, railway communication with the west coast would be of immense advantage, as a means of protection from future famines to the provinces of Mysore which are more liable to be affected by drought."

The collector of Malabar suggests that the Madras Railway, which terminates at Beypore, should be brought down seven miles to Calicut, which is the important trade centre of the district. He also recommends that the line now being extended to Mysore should be brought on through Wynad to the coast, and should have its terminus at Calicut. The Wynad Taluk, the seat of coffee enterprise, is very much in want of a line of rail to bring down and to take manure to the estates. The mortality in Mysore also might to some extent have been averted by such a line of rail. As it was, grain was laboriously carted up the ghaut roads to Mysore at enormous cost to the consumers.

The political aspects of the question hardly come within the scope of the present proceedings; but as they form an important factor in the consideration on which railway extension depends, the Board would passingly call attention to the extent to which these west-coast lines would facilitate speedy communication with Europe.

Effect of existing Railways upon Prices and Trade.—There can be no doubt that in the recent exceptional famine season the railways had the effect of stimulating trade and equalising prices in a most remarkable manner. Leaving out of consideration the earlier months of the famine, when there was a sudden panic, and trade had not sufficiently organised itself or adapted itself to the situation, the prices of second-sort rice at the head-quarter station of each district on the 1st August and the 1st September 1877, during which months the famine was at its height, were as follows:—

	In Seers of 80 Tolas for a Rupee.	
	1st August.	1st September.
Ganjam -	11.6	8.1
Vizagapatam -	7.3	6.2
Godavari -	8.0	7.4
Kistna -	7.1	7.7

MYSORE.

The railways have certainly equalised the prices, as can be seen from the following entries:—

Price of second-sort rice per rupee during—

	July 1877.	August 1877.
	Seers.	Seers.
Kolar -	5.9	5.5
Madras -	6.46	6.93
Bangalore -	5.75	5.75
Kolar road station -	6	5.87
Malur -	5.5	5.25
Mulwagal -	5.5	5.25
Goomnaiken-polya -	5.25	4.5
Goribednore -	5	4.5
Gudibunda -	5.25	4.5

the three last places being the remotest from the railway stations in this district.

They have also stimulated trade to a great extent, as can be seen from the accompanying figures,* annually supplied by the officers in charge of the railway

In Seers of 80 Tolas for a Rupee.

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	1st August.	1st September.
Nellore -	5.2	6.0
Kurnool -	4.6	5.0
Cuddapah -	5.8	6.6
Bellary -	5.1	6.5
Madras -	5.8	6.6
Chingleput -	6.0	6.8
North Arcot -	5.6	5.6
South Arcot -	6.1	6.6
Tanjore -	not given.	7.9
Trichinopoly -	5.6	5.8
Madura -	6.3	6.8
Tinnevely -	5.7	7.5
Coimbatore -	6.3	6.3
Nilgiri -	5.2	5.6
Salem -	5.3	5.3
South Canara -	7.8	7.8
Malabar -	7.1	6.7

It will be observed that in September prices ranged between five and eight seers per rupee, and that the variations in the first six districts, in which there are no railways, were generally greater than in the railway districts. The highest rate was in the district of Kurnool, which has neither rail nor sea communication, and it would undoubtedly have been much higher but for the railway in the adjoining district. The collectors of Trichinopoly, Madura, and Coimbatore all remark on the small difference in the prices prevailing in their districts and in that of Tanjore, from which they drew a great portion of their supplies. A reference to the reply to question 2 will show that a much greater diversity of prices prevailed in different districts in the earlier famines before rail and other communication.

Most collectors have confined their remarks to the obvious beneficial effects of the railways during the famine. With regard to local traffic and the equalisation of prices between different parts of the same district in ordinary years the evidence is not so clear, and it is doubtful whether the convenience of local traders is sufficiently considered in the administration of the railways. The collector of Malabar, Mr. Logan, remarks that in his opinion the encouragement hitherto given has not been what it might be, and suggests a judicious reduction in rates as regards certain classes of goods. Mr. Price, the collector of Chingleput, finds carting going on just as much as ever, and does not see much in the way of produce traffic by rail.

MYSORE.

Mr.
Krishnaiahengar.

stations in this district. I am of opinion that the construction of a branch railway from Kolar Road station to Gooty via Chintamanypet, Ganjigunta, and Bagepally in this district, and Penakonda and Hindupoor of the Bellary district, will prove very beneficial to portions of this, Cuddappa, and Bellary districts.

Value of Articles imported
and exported.
*Year.
Rupees.

1871-72	5,16,248
1872-73	16,16,905
1873-74	Information not available
1874-75	4,16,317

These were favourable seasons, and the articles imported and exported were valuable ones, such as cloths, sugar, jaggery, iron, &c.

1875-76	6,50,000
1876-77	15,37,334
1877-78	13,76,318

During these years drought prevailed, and food-grains were the chief importation, the exportations being comparatively less.

CHAPTER I.—QUESTION 20.

Give an account of the water communications in the province, what kind of boats are used, what their number is, and what the nature is of the traffic they convey. State whether the navigation is capable of any improvement, and whether it is conducted in natural channels or by canals; and, if by the latter, under what regulations. What is the ordinary cost per mile of boat carriage per ton?

PUNJAB.

PUNJAB.

Wace.

River Traffic.—The Punjab rivers are navigable from the point where they leave the Himalayas. And (omitting the Jumna on the east boundary of the province, which is a tributary of the Ganges), they all unite in the stream of the Indus at the south-west

corner of the province. The navigable length of each, the number of boats used for trade, the nature of traffic conveyed, and the usual charge per ton per mile is given below:—

River.	Length of navigable Course roughly estimated.	Principal Marts on each River.	No. and Size of Boats.	Nature of Traffic.	Usual Charge per Ton per Mile.
Jumna	Miles. 100 miles	Chaprauli, Baghpat, Delhi.	200, of an average size of 370 maunds (13½ tons), each aggregate capacity 2,700 tons.	Grain and fire-wood	9 to 12 pies.
Sutlej	450 miles from Rúnar to junction with Chenab.	Ferozepore and Baháwalpur.	50, of about 1,500 maunds each (55 tons) aggregate capacity 2,750 tons.	Trade from Ferozepore to Sukkar (400 maunds) and Kotri (600 maunds) in grain, oil-seeds, and wool, with a small return traffic of iron and saji (carbonate of soda).	Down stream 6 pies. Up stream 5 pies.
Beas	40 miles from border of Kangra district to junction with Sutlej.	No river traffic worth mentioning.			
Ravi	300 miles from Kashmir border to junction with Chenab.	No river traffic worth mentioning.			
Chenab	450 miles from Kashmir border to junction with Indus at Mithankot.	Aknur, Wazirabad, Jhang, Mooltan.	1,000 boats, varying in size, usually from 500 to 1,200 maunds (18 to 88 tons), and with an estimated aggregate tonnage of 20,500 tons.	Down stream. Grain and oil-seeds of all kinds, also sugar, ghee, cotton, country cloth, wood, &c. Up stream. Iron, dates, spices, saji, &c., a very small return trade.	7 pies.
Jhelum	200 miles from Kashmir border to junction with Chenab near Jhang.	Jhelum, Pind Dádan Khan, Khusháb.	200 boats, sizes from 100 to 1,000 maunds each; average size 500 maunds (18 tons). Estimated aggregate tonnage 3,700 tons.	Down stream. Grain and oil-seeds Up stream. From Pind Dádan Khan, salt.	4 pies.
Indus	500 miles from Attock to Sind border; and thence 90 miles to Sukkar, or to Kotri 350 miles. [The mouth of the Indus is about 130 miles below Kotri, or some 480 miles beyond the Punjab border.]	Attock, Kálábágh, Dera Ismail Khan, Dera Gházi Khan, Mithankot, &c.	700 boats, with an estimated aggregate carrying capacity of 18,000 tons, or an average of 26 tons per boat.	Down stream. Grain, seeds, cotton, wool, ghee, salt, &c. Up stream. Dates, indigo, cotton goods, metals, &c.	8 pies.

The traffic on these rivers has been greatly diminished by the opening of railways, and will diminish still more as soon as through communication by railway from Mooltan to Karráchi has been well established. The Deputy Commissioner of Lahore writes that the traffic on the Ravi has practically ceased since the railway was opened to Mooltan in 1865. The Deputy Commissioner of Ferozepore

makes a similar report concerning the Sutlej, and adds that what little boat traffic still survives on that river will probably almost disappear with the opening of the through line of railway to Karráchi.

The boats used on the Punjab rivers are flat-bottomed boats with square ends. They draw very little water, and are in this respect extremely well suited to the Punjab rivers, of which the beds are

wide and shallow, the stream sluggish, and the navigable courses shift continually, owing to the rapidity with which banks of alluvial deposit are formed. The principal boat-building marts are at Attock, Jhelum, and other towns near the foot of the Himalayas; the pine and cedar of which the boats are built being cut in these mountains, and easily floated down to the towns at their base. It is a common practice on all the rivers to build a boat, freight it to Sukkar or Kotri, and there sell it.

The cause which more than any other will increasingly contribute to the decline of the boat traffic is the great difficulty of obtaining return cargoes up stream. Even floating down stream in the flood season, with few demands on the energies of the boatmen at an average rate of perhaps 25 miles a day, the boats do not carry as cheaply as the railway, and the time taken is seven days for one day by railway. But in the return journeys up stream the boats do not average 10 miles a day. Moreover, the rates of freightage charged on the return journey usually are not remunerative rates, but are accepted because at higher rates the boats would get no freight. If these circumstances are considered, it will be seen that it is impossible for such river carriage to contend successfully with railways carrying direct to Karráchi or back at 5½ pie per ton per mile.

From 1862 to 1871 the Punjab Government maintained a small flotilla of three or four light-draught steamboats and barges on the Indus between Makhad and Sukkhar, but the boats never even approximately paid their expenses. Similarly up to the present date the Sind, Punjab, and Delhi Railway have kept up a steam flotilla between the termini of their Sind and Punjab lines (Kotri and Mooltan). But they are not usually able to carry grain and seeds even down stream by this flotilla at a cheaper rate than from 8 to 12 pies per ton per mile. (This statement is based on information supplied by the Company's agent.)

It is, of course, possible that engineers may succeed in building very light-draft powerful steamers, able to work at a much cheaper rate than those yet employed.

But, speaking from the experience of the past, it is clear that on the Punjab rivers neither native boats nor steamers can even approximately compete in cheapness of carriage with the broad-gauge railways.

The aggregate tonnage of the native craft on the Indus and rivers confluent with it, as above estimated, is a fraction less 45,000 tons, of which the Chenab and the Indus together supply 38,500 tons. We have no reliable data of the work done by each boat. If we assume three freights down and two freights up per annum, the total tonnage carried would be 2,25,000 tons a year. The goods traffic on the Sind, Punjab, and Delhi Railway for three years past has been:—

Year.	No. of Vehicles running.	Tons Carried.			Tons carried per Vehicle.
		Up to Mooltan.	Down to Delhi.	Total.	
1875	1,978	2,44,732	1,96,439	4,41,171	223
1876	1,938	4,20,207	2,50,633	6,70,840	346
1877	1,997	4,69,521	4,93,119	10,62,640	532

(Average size of vehicles 6-8½ tons.)

The Sind, Punjab, and Delhi Company's Indus steam flotilla* carried between Mooltan (up) and Sukkar and Kotri (down) during the same period:—

In 1875	-	-	80,000 tons
" 1876	-	-	1,35,000 "
" 1877	-	-	1,50,000 "

* Consisting of 11 steamers, aggregating horse-power 1,165

And registered tonnage - - - - - 2,473

Also 25 flats, with aggregate registered tonnage - 6,876

Total tonnage - - - - - 9,349

It is superfluous to comment on the bearing of these statistics. To a province in which the existing river carriage was only able 20 years ago to carry at the outside 3,00,000 tons a year, we have added in the interval a new flotilla carrying 1,50,000 tons, and a trunk railway carrying over a million tons a year; and this last means of traffic is as yet far from its full development, for the line from Lahore northwards is only half finished, and the extension southward from Mooltan to Karráchi, though lately finished, has yet to develop its traffic.

Canal Navigation.—The canal navigation of the province is as yet entirely undeveloped. The Sutlej, Chenab, and Indus inundation canals are not navigable, nor are they capable of being made so. The Bári Doáb Canal was designed for navigation, but experience has shown that its slope is too great; and it could not now be made properly navigable without incurring very heavy expenditure. The Western Jumna Canal is navigable from its head to Delhi,* and is used mainly for transporting fuel and timber to Delhi; the dues levied are fixed by Government under the Canal Act, and vary from nine to two pie per mile per 100 cubic feet of raft; the major portion of the traffic pays four pie. The Sirhind Canal, under construction, will be navigable from Ferozepore on the Sutlej eastwards to Patiala; and a project has been sanctioned for a navigable branch joining Patiala with the Western Jumna Canal at Karnál. The Agra Canal from Delhi to Agra (which is administered by the North-west provinces Government) is navigable, and carries a small grain traffic downwards to Agra, with a return traffic in building stone.

Cost of Boat Carriage.—The statement at the commencement of this reply, as well as the more detailed statements appended, shows that the ordinary cost of boat carriage per ton per mile by native boats on the Punjab Rivers varies from four to eight pie. On the Indus and Chenab Rivers, which carry 85 per cent. of the boats, the charge is seven and eight pie per ton per mile. The small traffic on the Delhi and Agra Canal is carried at three and four pie per ton per mile. The Sind, Punjab, and Delhi steam flotilla have charged during the past two years rates averaging per ton per mile 11½ pie for the shorter distance from Mooltan to Sukkar, and eight pie for the larger distance to Kotri. It is interesting to compare these rates with those charged for food-grains on the railway between Delhi and Mooltan, and these, as stated by the railway company's agent, are:—

	Per Maund per Mile.	Per Ton per Mile.
Ordinary rate for local booking -	Pies. 0·25	Pies. 6·8
Special rate for grain and seeds consigned to Sind, being taken on from Mooltan by the Company's flotilla.	0·20	5·44
Special rate charged in 1876 for grain booked through to Calcutta or Bombay.	0·18	4·89

The East Indian Railway Company are now charging at Delhi and other stations on their line for consignments of grains or seeds to Calcutta and Bombay 16·6 per 100 maunds per mile, which is 4½ pie per ton per mile. Thus, to the far superior rapidity and punctuality of railway traffic, we must also add that in the Punjab it is cheaper than the native boat traffic of the country.

* When the reconstruction of this canal has been completed, a total length of 127 miles will be navigable for boats, and 58 miles more for rafts.—E. WACE.

CONDITION OF THE COUNTRY AND PEOPLE OF INDIA.

NORTH-WESTERN PROVINCES AND OUDH.

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The parts which are best off in respect to water communication are the tracts which lie north of the Ganges. South of the Ganges only one river, the Jumna, is navigable, and this does not appear to be used to any very great extent. The collector of Etawah writes:—

“Two rivers—the Jumna and Chambal—meet in this district, flowing from the north-west to south-east corners. When the railway was opened all traffic practically left them. The winding nature of the rivers, the poor country through which they pass, the shifting sandbanks, and the ravines which border them for miles render all competition with the railway impossible.”

Any deficiency in water carriage by natural means south of the Ganges has, however, been more than supplied by the Ganges and Agra Canals, in the Meerut and Agra divisions.

In districts situated immediately under the Himalayas, such as Bijoor, the streams are mostly more torrents, dry throughout the greater part of the year, and, when flowing, so rapid that any navigation is impossible. In the more eastern districts more regular streams intersect the country, flowing with steadier currents and retaining their water throughout the year; such are the Rámanga and Garra in the Sháhjánpur district, the Gumti, the Tirhi in Gonda, the Bánganga in Basti, and the Rápti in Gorakhpur. All of these are used for the transport of grain and timber, which are floated down in the rains on boats or rafts of a size suited to the width and depth of the channel. By far the two most important rivers, from a navigation point of view, are the Ganges and the Gogra; next to them the Jumna and Gumti; then the Sárda and Rápti, together with the Rámanga and Garra, just above their confluence with the Ganges; and last, the Rámanga and Garra (higher up their courses), the Tirhi, Bánganga, and several other less important streams.

For navigation purposes the Ganges is divided into two portions by the Lower Ganges Canal dam at Narora. Above that the trade is chiefly in timber and bamboos, which are shipped on boats or rafts at wharves in the Bijoor and Saháranpur districts, and floated down to Garhmuktesar in the Meerut, or Anúpsahar in the Bulandshahr district. Thence the timber is sent across towards Delhi or Agra by cart. In the portion of the river immediately below Narora the traffic has been diminished by the canal dam, which no boats can pass. Below Narora the first important wharf is at Farukhabad, between which town and Cawnpore there is an extensive boat trade, amounting in 1876-77 to 6,54,785 maunds. The subjoined remarks relative to the trade are extracted from the replies of the collector of Farukhabad:—

“The cargo boats in use are clumsy but strong, with a superstructure of matting sides and thatched roofs extending almost from stem to stern, the steerage being from an elevated platform, and the propulsion by broad heavy sweeps, or, when wind and opportunity offer, by a ponderous sail. In burden they range from 700 or 800 maunds to 50 maunds. The whole cargo is, in such boats, well covered in. They convey food-grains of all kinds, indigo seed, cotton, linseed, aniseed, poppy-seed, mustard-seed, coriander and caraway-seed, to Cawnpore, Mirzapur, and Allahabad; and the chief season for the departure from Farukhabad of these large cargo boats is in April, May, and June, but large numbers also go down in the rains. The cost per 100 miles of boat carriage for one maund is one anna and four pie. At this rate the cost per ton would be Rs. 2-5-4 for a hundred miles, or 4½ pies per mile.

“The smaller cargo-boats are called ‘palwar,’ and the larger are called ‘katri.’ There are 12 of the former and 90 of the latter at ferries and bridges of boats in the district from Surajpur ghát to Mehndi ghát, stationary more or less. And of boats plying

up and down, there are 76 large and two small belonging to this district. The navigation on the Ganges is not susceptible, that I can see, of any improvement. The river from time to time alters its course so very much that the site of a heavy sandbank one year may be in the fairway of a channel the next. Every year, on both banks, some lands are submerged, and some again are thrown up by fluvial action.

“Boats must pick their way as they best can, and in the rains, at all events, they do not often go seriously aground.”

Eastward of Farukhabad there is a gradual increase in the navigation on the Ganges. There are wharves of importance at Cawnpore and Allahabad. In the year ending March 31st 1877 the total weight of goods embarked and disembarked at the Cawnpore wharf amounted to 7,20,247 maunds, of which 6,54,785 maunds passed between it and wharves up stream, and 65,462 maunds between it and down-stream wharves. Mirzapur used at one time to be one of the chief centres of Upper India, and then river streamers with flats used to ply regularly between it and Calcutta, but the completion of the East Indian Railway in 1863 was a severe blow to its prosperity, and for six years no river steamer has visited it. Formerly Mirzapur was the mart in which the produce of Upper India was collected for export to Calcutta, and this was naturally assisted by the facility for transport afforded by the Ganges. There are about 117 boats at Mirzapur of the kind called katras and patailas, the former with flat and the latter with round bottoms; these average from 200 to 1,000 maunds in burden.

The Ganges channel is constantly shifting, and navigation is tedious and difficult; most of the traffic runs down stream, the boats being often returned empty to the wharf of consignment. Below is compared the up-stream and down-stream traffic which came to or left the Cawnpore wharf in the year ending March 31st 1877.

Trade between Cawnpore and wharves:

Above Cawnpore.	
Down stream to Cawnpore	- 6,54,785
Up stream from Cawnpore	- 27,143
Below Cawnpore.	
Down stream from Cawnpore	- 63,037
Ups tream to Cawnpore	- 2,425

It will be noticed that the trade in the portion above Cawnpore is far larger than that below it. This is due to there being no railway between Cawnpore and Farukhabad, while there is one between Cawnpore and the chief marts below it.

Boat traffic on the Gogra is perhaps even more important than on the Ganges. In the year 1877-8 the total weight of goods which passed up and down at Darauli, on the frontier of these provinces, amounted to 43,36,741 maunds. These chiefly consisted of grain, sugar, and oil-seeds collected from the districts through which the Gogra passes on its way down from the hills. Commencing with the Bahraich and Kheri districts, the chief wharf is at Khairi, whence large quantities of grain are carried in the rains down to the Gorakhpur and Azamgarh districts and Chapra. Below Khairi is Bahranghat, where much of the timber is disembarked which is floated down the Koriáli from the Nepalese hills, the Koriáli being the name given to the Gogra where it first leaves the hills. The Gogra is also fed here by trade which comes down the Chauka or Sárda, though it would appear to no very great extent. Opposite the town of Fyzabad there is the Nawábganj wharf, where it is believed that the greater part of the Gogra trade centres. Grain and oil-seeds from Gondal, Bahraich, and Basti are collected here for shipment. The Tirhi, which meets the Gogra near Nawábganj,

is used for navigation in the rains, and acts to some extent as a feeder to it. Below Nawábganj there are several small wharves in the Fyzabad, Gorakhpur, and Azamgarh districts, at which the chief trade done is in the export of sugar. The Rápti flows into the Gogra close to the town of Barhaj, in the Gorakhpur district. It is navigable, like the Gogra, all the year round, and is used for the carriage of timber and grain through the Gonda, Basti, and Gorakhpur districts. A certain amount of timber is received by it from its tributary the Kunra.

The boats used on the Gogra are very large as a rule, having a capacity of from 500 to 1,500 maunds. Those employed on the Rápti are lighter and do not exceed 300 maunds. The number of boats which annually pass Nawábganj (including those from the Tirhi) is estimated at 1,500. Of these 200 are classed as capable of carrying 1,500 maunds, 800 capable of carrying 700 maunds, and 500 with a capacity of 500 maunds. The numbers plying on the Rápti is estimated at 152, of which 15 can carry 300 maunds; 42, 200 maunds; and 95, 100 maunds.

As mentioned before, navigation on the Jumna has much diminished since the East Indian Railway has connected the towns of Agra and Delhi with down-country marts and the port of Calcutta. Above Delhi the Jumna abounds in dangerous shoals, and is not, properly speaking, navigable for boats. The completion of the railway has withdrawn most of the traffic from the portion between Delhi and Agra (inclusive), and it is not till the border of the Jalaun district that its trade becomes anything at all considerable. Between this point and Allahabad there are three or four wharves situated on the southern bank, the most important of which are Rájapur and Mau, in the Banda district. In the year 1877 the exports from Rájapur by the Jumna amounted to 2,56,569 maunds, while the imports were 1,25,544 maunds. The trade of Mau is less than that of Rájapur, which is the principal depôt for the grain and cotton of the Banda district.

The following remarks are taken from the Banda Famine replies:—

“There are seven boats of the ordinary kind used for traffic in Mau, capable of conveying 1,650 maunds of merchandise, and 12 of the same kind in Rájapur capable of conveying from five to 6,000 maunds of merchandise. The traffic which is conveyed by them consists chiefly of grain, cotton, and wood.”

“The traffic is chiefly from and to Allahabad, Fatehpur, Cawnpore, Mirzapur, Benares, and Patna. The average cost per mile per ton varies as to the place to or from which merchandise is conveyed.”

The following are two examples of the freights from Rájapur per 100 bags of 2 to 2½ maunds each (about 8 tons):—

	Amount.	Per Ton per Mile.
Allahabad - 53 miles	Rs. 6 0 0	nearly 3 pies
Mirzapur - 105 „	Rs. 24 0 0	5 „

and from Mau to the under-mentioned places for the same quantity of goods:—

	Amount.	Per Ton per Mile.
Allahabad - 28 miles.	Rs. 6	5 pies
Mirzapur - 60 „	Rs. 8	3 „
Benares - 84 „	Rs. 10	5 „

Next in importance after the Jumna comes the Gumti, which, rising in the Tará at the foot of Kumaun, flows past Lucknow down the Gogra-Ganges Doab, and falls into the Ganges near Gházipur. The river Sái meets the Gumti near Jaunpur, having followed much the same course, but not being navigable. The Gumti is navigable as far up as the Hardoi district; but since the opening of the East Indian Railway it carries little or no trade to or from that district, as the railway directly competes with it. It is not till below Lucknow that it is much used for carrying purposes, where it is needed for the con-

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veyance of the grain of the Sultanpur and Partabgarh districts to the mart of Jaunpur. At Jaunpur the grain either takes the railway or passes on in boats down to the Ganges. The boats used in the Sultanpur district are “dongas” or dug-outs, and barges varying in draught from 100 maunds to 300 maunds. The former are used to carry down timber and firewood, and generally come from the districts west of Sultanpur (Hardoi and Sitapur). There are about 100 in the district of Sultanpur itself. The larger boats are for the conveyance of grain and oil-seeds, and they come up from Patna and Jaunpur, going on westwards for grain and oil-seeds wherever they can be found and obtained. The chief drawback to navigation on the Gumti is the extremely winding course its channel follows. This peculiarity, in which it resembles the Rápti, greatly increases the difficulty of navigation as well as enormously adding to the length of the journey.

Other navigable streams which flow through the Hardoi district are the Rámanga and the Garra: both are chiefly used for the carriage of timber and wood down to the Ganges near Farukhabad. Both these streams are only navigable in the rains for anything more than boats of two or three tons. The Rámanga above Budaun is only used for floating down rough rafts of timber from the forests at the foot of the hills. In the Hardoi district, near the point of confluence with the Ganges, both Rámanga and Garra have deeper streams, and are used for the carriage of boats between that district and Cawnpore or Allahabad. These boats vary from 500 to 250 maunds in draught, and usually carry down freights of grain, firewood, and grass. In the Hardoi district there are 16 such boats on the Rámanga and four on the Garra. For boats of this size both rivers are navigable all the year round, and can take boats of 500 maunds’ capacity when swelled by the rains.

Besides the rivers and streams above mentioned, there are many others which are used in the rains to float down jungle produce from the foot of the hills. There are four such streams in the Hardoi district, which act as feeders to the Gumti, Garra, and Rámanga and others in the Basti and Gorakhpur districts, such as the Bánganga and Kunra (or Dhamela).

The only rivers in the provinces which are navigable all the year round are the Gogra and Ganges, throughout their length; the Jumna, below Delhi; the Gumti, below Sitapur; the Rápti, below Basti; and the Rámanga and Garra, a short distance up above their confluence with the Ganges.

As regards the cost of carriage by river, it may be stated that, as with cart carriage, the freights are not so much calculated on a mileage rate as fixed fares from one wharf to another, which, though undoubtedly primarily regulated by the distance, appear in many cases to have been much modified by other causes, such as custom. The rates given by district officers are evidently obtained by dividing some of these customary fares by the number of miles which lay between the wharves of despatch and consignment.

For the Ganges, 4½ pies per mile per ton is given as ruling in Farukhabad.

„ Gogra, 3½	pies	Gonda.
„ Jumna, 3 to 5	„	Banda.
„ Gumti, 6	„	Lucknow.
„ Garra and Rámanga, 4½	„	Hardoi.

But to these must be added cost of insurance and some extra expenses, which will considerably increase the rate per mile. Some 90 per cent. of the cargoes which pass up or down the Ganges are insured by the owners against theft, fire, or wreck. The insurance is effected by men called bimawallas (bima=insurance), and is often at the rate of 1½ per cent. on the value. The “bimawalla” puts one or two servants of his own in charge of the cargo to ensure fair play, and these are paid at the expense of the insurer. These

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extra expenses will be often found to add as much as one-fourth more to the cost per ton per mile, raising it from four pies to five pies, or even more than this. The rate per ton per mile for grain on the East Indian Railway is $5\frac{1}{2}$ pies, and the quickness of delivery by rail, and the certainty in the time of arrival, appear to more than compensate for the excess.

The rivers and streams used for navigation in these provinces have now all been noticed. The canals remain. Excluding the small irrigation canals of the Dún, Rohilkhand, and Bundelkhand, the chief canals are four,—the Upper Ganges, the Lower Ganges, the Eastern Jumna, and the Agra. All these more or less follow the course of the Ganges and Jumna Rivers, from which they are fed. The first three lie in the Ganges-Jumna Doab, while the fourth runs between Delhi and Agra, a short distance south of the Jumna and almost parallel with it. The Upper Ganges Canal runs from Hardwar, where it receives the water of the Ganges, to Cawnpore, where it pours its surplus back into the same river. It has two branches or off-shoots, one which leaves it in the Muzaffarnagar district and runs towards Farukhabad, and another which leaves it in the Aligarh district and runs through Etawah down to the Jumna. Of all the canals only the Agra and the Upper Ganges are used for navigation, and of the latter only the main line between Hardwar and Cawnpore.

Traffic on the Upper Ganges Canal is carried on in boats or barges belonging to private individuals, but taxed by the Canal Department. The following note has been furnished from the office of the traffic manager, Ganges Canal:—

"The pattern of boat commonly in use by native traders on the Ganges Canal is a flat-bottomed wooden vessel, with an average carrying capacity of about 750 maunds each (=about $27\frac{1}{2}$ tons). All cargoes are carried above the gunwale, and are consequently exposed to the weather at all seasons of the year. There are at date 263 merchants' or private boats plying on the canal, and besides these there are 13 iron barges belonging to the Canal Department, and 20 iron and wooden boats employed by divisional officers, making a total of 296 in all. Boats are divided into three classes, and each class pays a different rate of toll. Class A. includes all boats over 10-foot beam, and these pay a toll of Rs. 20 a quarter. Class B. includes all boats between 6' and 10' beam, and pay a toll of Rs. 16 a quarter. Class C. all under 6' beam, and pay Rs. 8 a quarter. Tolls may be paid in advance, or at any time during the quarter, and when payment is made the boat owner receives a printed receipt showing the date of payment, owner's name, boatman in charge, number of boat, and amount paid. Once every quarter the traffic manager goes over the whole canal, takes up receipts, and issues printed rawannas in their stead; in this is entered the owner's name, number of boat, and date up to which payment of the tolls has been made. The amount entered in the rawannas must agree with the collection paid into the Government treasuries at the different stations, and the whole must tally with the number of boats shown in the boat register book. The register is kept by the traffic manager, and is checked by the whole number of boats found on the canal when rawannas are issued.

"Great improvements as regards navigation have been made in the canal of late years, but much still remains to be done to make the stream a thoroughly reliable means of transport. The weekly closure of the Cawnpore branch, and the uncertainty of water supply during periods of minimum irrigation, are the two chief obstructions to navigation at present; when these are removed, and traders can calculate with tolerable certainty upon free navigation at all seasons of the year, it is believed that a better class of boats will be put upon the canal, and that the revenue from tolls will form a very considerable item in canal receipts, and besides this, what is of far more im-

portance, is the facility which will be afforded to cultivators in canal districts for getting their produce to a market at a reasonable charge for carriage."

The traffic on this canal was registered at the Cawnpore end under the Department of Agriculture and Commerce in the year 1876-77. The total weight of the traffic which passed the registration post here was 12,55,151 maunds.

The trade chiefly consists in grain which is brought down to Cawnpore from wharves in the districts of the Agra and Meerut divisions. The total amount of trade which passed up and down the canal in the year 1877-78 was 1,415,250 maunds.

The freights are not regulated by the canal authorities, but boat owners are allowed to make their own arrangements, so it is difficult to arrive at any very correct estimate of the cost of water carriage to the public; but taking the average cost of carriage in the canal department, the rate would be for long distances about 2-25 pies per ton per mile, and for short distances 2-5. The collector of Mainpuri puts the rate so high as 3-5 pies per ton per mile.

The following remarks as to the navigation on the Agra Canal are taken from the Navigation Report for the year ending 31st March 1878.

There are on the canal 72 boats belonging to private persons, which can carry on an average 400 maunds a-piece. There are also 20 boats belonging to the canal authorities. The total amount of traffic carried along the canal in the year was 104,706 maunds, of which 28,609 maunds went up and 76,097 maunds went down. This is very small, considering that the canal passes by the three large towns of Agra, Muttra, and Delhi, with the two former of which it is connected by still-water navigation channels of considerable length. The down-traffic is chiefly in grain and sugar, both of which come from Delhi, where they are collected from the districts of the Meerut division. The most noticeable item in the up-traffic is sandstone from the quarries of Sikandra, near Agra. Besides the boat traffic, some 1,61,582 cubic feet of sleepers were floated down in rafts; these were supplied by the Forest Department to the Gwalior State Railway.

A toll of Rs. 20 per quarter is levied on all private boats, giving an income of Rs. 1,424. Rs. 3,933 more were realised from the tolls on rafts.

The canal has been open for navigation for comparatively speaking a short time, and the freights do not yet appear to have settled themselves. When the canal was first opened, and there was but little competition of cargoes, as much as Rs. 18 were paid for the conveyance of 100 maunds (about $3\frac{1}{2}$ tons) up stream from Sikandra (near Agra) to Delhi, and Rs. 17 down stream from Delhi to Sikandra. The effect of gradually increasing competition amongst boat owners was to reduce these freights, till the following figures were reached, apparently the minimum rates at which it will pay owners under existing tolls to carry goods between Delhi and Sikandra:—

Down stream, Rs. 6 per 100 maunds (= $3\frac{1}{2}$ tons) = $3\frac{1}{2}$ pies per ton per mile.

Up stream, Rs. 10 per 100 maunds (= $3\frac{1}{2}$ tons) = $5\frac{1}{2}$ pies per ton per mile.

As regards the profit which the canal may be expected to make from navigation, independently of the irrigation for which it was primarily intended, the following remarks of H. M. King, Esq., Executive Engineer, in charge of navigation, Agra Canal, may be quoted:—

"I think it has been conclusively shown in one of the printed papers connected with the revised estimates of the scheme, that the net revenue from navigation can never pay the interest on the capital expended in making the Agra Canal navigable * * * I am convinced that the most satisfactory and certain way of increasing this revenue would be to exclude all private boats from the canal, and to extend our own boating operations."

1. The reasons why the Ganges Canal is not more used for traffic are chiefly as follows:—

1. To meet the requirements of irrigation, it has not been carried past any large towns or markets. Roorkee and Cawnpore are the only two towns situated on it, and the former has no commercial importance.

2. It forms an unconnected link of navigation. The river below Cawnpore is with difficulty navigable at all except during the rains, and, practically speaking, all the down-country traffic here takes the railway.

3. The velocity of the stream is so great that up-stream traffic can only be effected with difficulty and very slowly.

4. The Cawnpore branch of the canal, 180 miles long from the Aligarh district downwards, is closed every alternate week.

5. Until the year 1873 much inconvenience was caused by the want of headway under the bridges; and until April 1877 a series of accidents necessitated the closure of one lock after another, and the consequent interruption of traffic. Both these obstacles are now satisfactorily removed.

2. To remedy the first drawback—the distance from towns—projects have been prepared for taking branch canals into Meerut (8 miles), into Khurja ($2\frac{1}{2}$ miles), and into Aligarh (9 miles), but hitherto want of funds has prevented their execution.

3. For a similar reason the removal of the second obstacle mentioned above has been deferred. It has been proposed—

(a.) to connect the canal with the Khatauli Railway station, district Muzaffarnagar, a distance of less than two miles;

(b.) to connect the canal near Murádnagar with Delhi and the Agra Canal, a most important link by which large traffic might be confidently expected from the interchange of the sugar and wheat of the North-western Provinces with the cotton and salt of Rajputana and the country west of the Jumna; the connection of Delhi and Cawnpore, too, would be of value;

(c.) to prolong the Ganges Canal past Cawnpore to a point in the Ganges or Jumna up to which there is free navigation throughout the year, thus affording a free outlet to the grain which is in a chronic state of block at the Cawnpore Railway station.

4. The velocity of the stream in the Ganges Canal has been considerably lessened during the last few years by the interpolation of weirs and locks, and it is not probable that much more can be done in this direction. Although it is a great obstacle to up-stream traffic, it is a great help to all that goes down stream, since the boats are floated down entirely by the current; and as the down-stream traffic would probably in any case greatly exceed the up-stream, the inconvenience is not so great as might be supposed. Nor is the fourth obstacle I have mentioned. The closure of the Cawnpore branch is so well known that the boatmen know how to time their trips accordingly; and as the channel at the lower end is rarely without some water in it, boats can ply a considerable distance even in the closed weeks. The completion of the Lower Ganges Canal, now not far off, will make this branch to be run constantly.

5. Local traffic between intermediate points on the Ganges Canal is almost unknown. With the view of encouraging it, a lower rate of tollage was fixed in 1877 for smaller boats, but none have begun to ply.

6. Probably for this reason there has never been any navigation on the Etawah branch of the canal, which was originally intended for traffic as much as the Cawnpore. A costly flight of locks into the Jumna, a few miles above Hamirpur, was half-built, and abruptly stopped by the Mutiny in 1857, never to be renewed. In other respects the Etawah branch was just as fitted for navigation as the Cawnpore until the bridges in the latter were raised, but not a single boat has ever plied on it.

7. The navigation of the Agra Canal has none of the drawbacks which that of the Ganges Canal has. The velocity of the stream is very low; ample headway has been given to the bridges; branch lines have been carried into the cities of Agra and Muttra; while the Punjab Government are now connecting it with Delhi. Navigation has here, then, got every chance. The canal has only been recently opened throughout its length, and a large boat traffic may reasonably be expected on it.

8. Until the Ganges Canal is linked on to Delhi, and either by its prolongation beyond Cawnpore or by increased railway power the goods are prevented from sticking there as they now do, I do not think it would be judicious to raise the tolls higher than they now are. In 1877-78 I find the ton-mileage on the Ganges Canal was 9,500,225, and the State charge Rs. 20,227, that is, 409 pie per ton per mile. Colonel Brownlow calculated the State charges on the Godavari in 1876-77 to be $\frac{2}{3}$ pie per ton per mile; and he says that on the Erie Canal it is nearly $1\frac{1}{2}$ pies per ton per mile, and on the French canals $\frac{3}{4}$ pie for first-class and $\frac{1}{2}$ pie for second-class goods. The Bengal Government, with their present policy, would, I have no doubt, quadruple our charges right off; and I cannot say for certain that this would reduce the number of boats very much, but I think it would to some extent. ~~really~~ really, I think, we must give up the idea of making navigation directly profitable anywhere, and rather study how the general welfare may be benefited by it. On the Agra Canal, too, I should oppose raising navigation rates, at least until the traffic has become developed.

9. At one time I was very hot on a Government boat train, but after my experiences on the Deltas and in Orissa I am not. If navigation were hanging back on a new canal, I think it would be an excellent plan to introduce it by a fleet of Government boats, but I would sell them as soon as the traffic had fairly sprung into life. With a Government train there is the danger of choking off private traders. There would be a difficulty in suddenly expanding to meet the wants of a year of drought. And, in short, I think the *onus probandi* lies with those who would propose that Government should be carriers, and my opinion is that the present system could not thereby be improved. There are regular native agencies who work with simple and inexpensive apparatus, and I think they are better suited to the people than anything we can substitute.

BENGAL.

Water Communications.—No other part of India possesses such magnificent water communication as Bengal Proper. It may be said to be its distinguishing physical characteristic. The Ganges flowing

from the north-west, and the Brahmaputra from the north-east, meet, and flow to the sea through the great rice-growing delta of the province. They are navigable throughout the year, and almost all the

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other rivers of Bengal are feeders of or distributaries of these two main lines of communication, as a glance at the accompanying map will show. Numerous inlets and outlets permeate nearly all the districts of the country.

The following description of the great trade routes of Bengal, which are chiefly water routes, is taken from Mr. Cotton's "Report on the Internal Trade of Bengal" for 1876-77:—

Trade Routes of Behar.—From the three frontier northern sub-divisions of North Behar there are two great currents of export trade, the one making south-west and the other south-east towards the Ganges. Of the former the staple is rice. The routes followed by this trade are overland, crossing the courses of the numerous rivers which flow through the country. This trade is entirely restricted to the dry months of the year; it commences in December and it ceases in May, herein naturally following the condition of the weather and the seasons of harvesting. The trade loses volume as it proceeds, for it largely supplies the Tajpur and Hajipur sub-divisions of Tirhut and the Beguserai sub-division of Monghyr, regions which are more profitably devoted to non-food staples and to rubber crops than to rice. For the most part this traffic is not river-borne.

The second current of export trade from Behar tends southwards in the first instance to the Ganges, or to the marts situated on the larger affluents of the Ganges, and then it sets south-east to Calcutta. This trade is chiefly in oil-seeds, and it is to a large extent river-borne. The other articles of export trade find their way along this route to Calcutta, with the exception of tobacco, which is exported to Patna, the North-Western Provinces, Central provinces, &c.

Generally speaking, it must be said that the rivers of Behar, other than the Ganges, are ill suited for navigation. They are rarely navigable except during the rainy season, and at that period are not unfrequently rapid and dangerous. In consequence, the greater part of the trade of Behar is carried overland along the roads with which the province is now so well provided, and the river-borne export trade is brisk only during the months of July, August, September, and October, when the rivers are full of water.

Trade Routes of Northern Bengal.—From North Behar it is an easy transition to the tract of country technically known as Northern Bengal, which comprises all the districts of the Rajshahi and Cooch Behar division. This tract of country may be roughly described as extending from the Mohananda on the west to the Brahmaputra on the east, and from the Tista on the north-east to the Ganges on the south-west, comprising a portion of the districts of Purnia and Jalpaiguri and the whole of the districts of Rangpur, Dinajpur, Bogra, Rajshahi, Pabna, and Malda.

The Mohananda and the Tista take their rise in the Darjiling hills in close proximity with each other at the north-western corner of this tract of country; and taking the Mohananda as the western boundary, and the Brahmaputra as the eastern boundary, it may be said that the general flow of all the Northern Bengal rivers south of the Tista is from north to south. Some flow to the south-west, and eventually empty themselves in the Mohananda, while the rest meander away to the south, and become merged in the Chullun bheel, whence in the rains they afford easy communication with the Ganges or Brahmaputra.

The line between these two sets of rivers is distinctly marked. The Purnabhaba, on which river the town of Dinajpur is situated, runs into the Mohananda, and all rivers to the west of the Purnabhaba do the same; while the Atrai, and all rivers to the east of it, flow into the Chullun bheel or the Brahmaputra. The space, therefore, between the Purnabhaba and the Atrai is the watershed of the whole country. The produce sent along the

Purnabhaba and the rivers to the west is exported up country; the produce of the Atrai and of the rivers to the east finds its way to Calcutta.

These rivers are traffic routes for three or four months of the year during which the rains last. During the remaining eight or nine months of the year there is not sufficient water in them to afford an outlet for the products of the country, and consequently all goods must be carted to some point where there is direct water communication with the Ganges or Brahmaputra, or must remain where they were produced until the rivers open at the end of June. The rivers Jabuna, Nagor, Gur, and Baraloi, all in the southern districts, are navigable by moderate-sized craft for a longer period than others.

The staple productions of the country are rice, jute, and tobacco. The greater part of the rice crop is not harvested till January, by which time the rivers are dry; and as rice is so cheap that it will not stand the expense of any lengthened land carriage, it remains mostly stored up in the district for months, until the rivers begin to open again, when it is sent off in great quantities. Jute also is a crop that does not fit in with the rise and fall of the rivers. It is a crop which is grown in the rains, and which is only coming to hand when the rivers are beginning to fall, so that only the very early samples of the new crop get down that season, unless it is grown in the immediate vicinity of a river open all the year round. Tobacco, on the other hand, comes in in April, and has therefore only to be kept for a couple of months before it is in the market, if the cultivators and dealers choose to come to terms as to the price. The cultivation of tobacco, however, is local and limited, and, as a rule, it may be fairly said that for some eight months of the year there is no natural outlet for the main productions of the country. The plan usually adopted by those engaged in trade is, therefore, to settle down on the banks of one of the rivers, and then accumulate, through the agency of paikars or by purchasing on their own account, the goods which they intend to send down country. Thus on the Atrai there are to be found, at distances varying from five to 10 miles, marts doing a larger or smaller trade which are depôts for the receipt of the produce of all the surrounding country, and the same is the case in a greater or less degree with all the rivers in this part of Bengal. As long as the rains go on, and the rivers keep full, the process is easy enough, as the largest boats can then go up the Atrai quite easily; but at the end of October, when the rivers begin to fall, a great change occurs, and articles for export have to be carted over very bad roads, often over none at all, till they reach some place where water communication with the Ganges is available for boats of some size. But as the season goes on the size of the boats diminishes even at those places where there is most water, and rafts and dinghies of the lightest construction have to be brought into play. It may be expected that the opening of the Northern Bengal Railway will afford a very advantageous opportunity for the ready transit of produce, and so relieve the block which at presents sadly impedes the commerce of the country during the greater part of the year.

Trade Routes of Central Bengal.—The Nuddea rivers is a general name for the extensive network of affluent and effluent streams of which the Bhagirathi, the Jallinghi, and the Matlabhanga are the principal channels.

The loop line of the East Indian Railway is in a great measure in direct competition with the Bhagirathi River route, and doubtless the railway has been the principal cause of the large reduction of the river traffic. The Bhagirathi now only carries 40 lakhs of maunds in the year, whereas formerly it carried 100 lakhs, and in one year, 1842-43, the registered traffic amounted to 120 lakhs. The whole of the cotton, the whole of the indigo, and more than half the saltpetre and sugar, as well as a large proportion of other staples, have been attracted from the river by the railway. But with every allowance

made, it would seem that the river has deteriorated as regards navigation. Even now a considerable quantity of traffic, amounting to about two lakhs of maunds in the year, comes into Calcutta from Behar by the Calcutta canals. The ordinary channel for Behar produce is along the Bhagirathi River; but during the dry season the up-country merchants, if they export at all, are now compelled to avoid the Bhagirathi and to send their boats the long route down the Ganges as far as Kashten, along the Gorai, the Modharatty, and Atharabanka, and so by Khulna into the canal routes.

Similarly, the Eastern Bengal Railway is in direct competition with the Matlabhanga, and, to a less degree, with the Jallinghi River route; and as regards the local trade of the district of Nuddea, and, to a smaller extent, as regards the trade of the neighbouring districts of Rajshahi and Pabna, it has certainly succeeded in diverting a large part of the traffic. But merchandise of which the bulk is considerable, such as food-grains, oil-seeds, and salt, still ordinarily adheres to the old route. The railway carries nearly the whole of the cotton piece-goods, indigo, chillies, turmeric, and sugar. The jute carried by the railway has also reduced the Nadiya River traffic, although the bulk of the river-borne jute is not carried along these rivers, but comes from North-eastern and Eastern Bengal along the Sunderbuns route into Calcutta. The traffic of Northern and Central Bengal is carried by the Jallinghi and Matlabhanga.

Trade Routes of the Delta.—It is impossible to give in this place a systematic account of the great river system of the districts of Jessore, Faridpur, and Backergunge. The interlacings of the rivers are so complicated, and the swamps in which the channels lose themselves or merge with other streams so perplexing, that the thread of the narrative must be constantly interrupted, and it could only be made intelligible to the reader by frequent reference to a map on a large scale.

Trade Routes of Eastern Bengal.—The whole of Eastern Bengal is a network of river communications which afford unrivalled facilities for the carriage of merchandise. The largest rivers are the Jamuna and Megna, both off-shoots from the Brahmaputra. The Megna is formed from the confluence of the Surma and Brahmaputra.

Trade Routes of Western Bengal.—On the western side of the Gangetic delta the rivers have little or no connection with the main system of the country. The Damodar, the Rupnarain, and the Kasai may all be said to join the Hooghly between Calcutta and Saugor Island; but they are isolated rivers which do not help to form the delta, and are independent in character. They are very unfavourable for navigation, being shallow in the cold weather and violent during the rains. They carry but little trade, and the surplus produce of Western Bengal, so far as it is not tapped by the Hooghly River, is borne away by the roads and the East Indian Railway to Calcutta.

The trade of the Midnapore district is greatly facilitated by the two canals which run through the district, viz., (1) the Hidgellee Canal, 32 miles of which are open, leading from Geokhally at the junction of the Roopnarain and Hooghly to the Rasulpore River, and (2) the high-level canal. Besides the Hidgellee, or low-level canal, there is an alternative route called the Bahirgang, which follows the course of the tidal estuaries as far as the junction of the Hooghly and Rasulpore, and thence

proceeds up the Hooghly. This route is exposed and dangerous during the stormy months of the year; but, on the other hand, being entirely tidal, it admits of being traversed in one ebb and two floods with hardly any labour or exertion, and without the payment of toll. Hence the bulk of the traffic only goes up the canal in March, April, May, and October, when bad weather may be apprehended, but in the other months only the more valuable cargoes use it. The high-level canal does for the north, centre, and west of the district fully as much as the low-level canal does for Hidgellee and North Balasore, with the difference that, except for the last two reaches there is no "Bahirgang" to compete with the canal for the bulkier cargoes.

Trade Routes of Orissa.—The three great Orissa rivers, the Subarnrekha, the Baitarni, and the Mahanadi, have a direction generally parallel to one another and a south-easterly course, the two former rising in Chota Nagpore and the latter in the Central provinces. The rising parts of Chandballe and Mourigong are about 25 miles inland, on the banks of the Baitarni River. The two places are nearly opposite to one another, Chandballe being to the north in the Balasore district, and Mourigong to the south in Cuttack. The Mahanadi is navigable for boats for 460 out of its 520 miles, and near Cuttack is about two miles in breadth during the rains. The trade of Orissa is, however, far more even than in the case of Midnapur dependent upon its canals than upon its rivers.

These canal routes may be described separately. Beginning with the northern part of the province, we have the Sone canals connecting the upper reaches of the Sone with the Ganges by two branches—the one passing through the Shahabad district and locking into the Ganges near Arrah, the other through the Patna and Gya districts into the Ganges near Patna. On both these canals the traffic is as yet in its infancy, but may be expected to develop to a very large extent.

The Calcutta circular canals afford communication for an innumerable fleet of small country boats with the creeks and rivers running into the Sunderbuns. The Midnapur canals have been described above.

In Orissa, Cuttack, the capital of the province, is connected by canal with its chief port, False Point. Chandbally, another port, is also now placed in direct water communication with Cuttack, and the completion of a contemplated low-level canal to Midnapur by Balasore, which would probably not cost more than 30 lakhs of rupees and would yield a fair profit on outlay, would place Cuttack within reach of Calcutta by inland water communication.

The boats chiefly employed on the water routes above described are the ordinary kind of country boats which have been in use for centuries. In carrying tea and valuable products river steamers are employed, but to a comparatively small extent, as the table given in the answer to question 17 will indicate.

It is quite impossible to give the number of boats employed. The general rate for boat carriage throughout Bengal is three pie per ton per mile, exclusive of tolls.

The navigation of the various small creeks and inlets which permeate in all directions is doubtless susceptible of improvement, especially in Eastern Bengal. The Road Cess Act provides for such improvements, and they are being gradually carried out from road cess funds.

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There are no canals in these provinces. The boat service at the ferries, lying on the principal traffic routes, may be said to be adequate. Except at the

ferries and for the rafting of timber, practically speaking, water communication is limited to a part of the Weinganga, from 10 miles from the head-quarters

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of the Balaghat district to Bhandara, and thence downwards through the Chanda rice-field, with occasional interruptions to Sironcha, and again from Seorinarain on the Mahanadi to Cuttack. I am not prepared to say that positively no improvements to the navigation could be effected at a reasonable expense, but it is believed that nothing of much importance in this way could be undertaken with any hopes of an adequate return for the capital which would be required.

The Deputy Commissioner of Sambalpur gives the following account of the Mahanadi boat traffic:—

"There is water communication by the Mahanadi up the river to Seorinarain and down the river to Cuttack. The boats used are rather narrow with flat bottoms, and their dimensions, &c. are—

Length	-	30 to 80 feet.
Breadth	-	3 to 7 feet.
Capacity	-	30 to 250 maunds.
Crew	-	4 to 13 men.

"As to how many boats of each class are available, the following figures were put before me last year, when a report was being drawn up for the Quarter-master General's Department. I cannot answer for its absolute correctness, and am now having a fresh inquiry made, the result of which will be reported if desired:—

Name of Class.	Divisions.	Load, Maunds.	Hire per Crew.	Number available.
3 pahal	60 × 2	30	Rs. 22	70
3½ "	60 × 3	35	" 30	57
4 "	61 × 3½	50	" 36	75
4½ "	62 × 4	80	" 48	60
5 "	67 × 4½	120	" 58	52
5½ "	70 × 4½	150	" 68	30
6 "	75½ × 5½	180	" 76	12
6½ "	77 × 5½	225	" 84	3
7 "	80 × 6	250	" 100	1
Total number of boats available				360

"Since the above return was submitted I have heard that the number is much larger, and the most careful inquiries will now be made, but this will take time. The boats are usually employed in bringing up salt, piece-goods, brass work, cocoanuts, &c. from Cuttack or this and the Bilaspur district, and taking down Cuttack grain, wheat, oil-seeds, myrabolans, lac, &c.

"The smallest boats can ply all the year round, the longest only for six months, viz., during the rains and early part of the cold weather.

The cost of carriage per ton per mile, at the rates now prevailing, is 2½ annas."

For Balaghat, I would refer to page 54, where Major Bloomfield mentions the traffic in the rains. The present Deputy Commissioner writes:—

"There is water communication during the rainy season on the Weinganga from Chizgaon, 10 miles from the Sadar station, down the river. About 50 canoes are employed, of which only 15 belong to this district; the rest come from the Bhandara district. The traffic is in gram, rice, wheat, urad, tur, &c.

"I do not personally know, but am informed that the navigation during the rains between Chizgaon and Bhandara is easy, and that the rocks are then covered. * * The cost of boat hire per ton per mile is about one anna."

The Deputy Commissioner of Bhandara writes:—

"The Weinganga River and a portion of the Baghnaddi (in the direction of its junction with the former) are navigable during the rains only. I do not think the navigation is capable of improvement. It is only during the few rainy months that boats can ply on these rivers, owing

to the number of rocks which cover their beds every here and there.

"There are about 225 small canoes (being simply trunks of trees hollowed out) used for the carriage of merchandise. There may be probably 200 more which could be made available in case of necessity. These are only used for the transport of grain; a canoe will carry from 1½ to 1½ ton, at an average cost of 2 annas 4 pie a mile.

The following account is taken from the Bhandara Settlement Report:—

"During the early bursts of the monsoon navigation is not attempted; but ordinarily, during the rainy season, canoes ply on the river in every direction. Its broad bosom now takes the place of the fair-weather roads; its current carries the traveller down rapidly, but a voyage up stream is tardy and toilsome. The barriers at Chizgaon and Tiddi prevent river traffic from becoming general. In fact, navigation is bounded by these impassable rocky steps. * * Rice and gram are carried in canoes scooped out of the trunks of trees. These canoes are in length about 30 feet, and have been hitherto made of teak trees from the Panabaras forest. But now, the bijasal is also coming into use for canoe purposes, as the supply of large teak is falling short. Fifteen years ago (from 1867) a teak canoe was obtainable at Rs. 60 or Rs. 70, now they run from Rs. 125 to Rs. 150. A good canoe lasts from 25 to 30 years. It has been computed that 100 canoes and 400 watermen are employed in the navigation of the Weinganga during the five months that it is open, and that 23,000 maunds of rice and other grain are brought down by it."

The Weinganga, below the junction of the Kanhan, again becomes navigable for these small river boats, and so continues through the Chanda rice country to Garcharoli; but from this point to a point level with Ahiri, in the south of the district, navigation is much more difficult. From Ahiri, which is considerably below the junction of the Wardha River, the Weinganga again becomes open, and this open section continues to a distance far below Sironcha. But the river traffic in this district is not considerable, and is confined to the months of August, September, October, and November. There is some amount of river traffic in the Sironcha section of the Godavari and of the Pranrita.

The late Officiating Deputy Commissioner writes thus:—

"There is water communication through the whole length of the Sironcha taluk, and also along the length of the other three taluks; but except in very full floods, no boats could at present descend from the Sironcha to the other taluks. There used formerly to be boats on the upper portion of the rivers here, but all of them have now rotted away. There are no boats on the lower portion of the Gadavari in this district, but they can be procured from Rajamundry, and return boats can also sometimes be procured. A steamer too, occasionally during the rains, comes up as far as Tarlagudiam, which is nearly opposite Enchampilly and just below the second barrier on the Godavari. The boats used are flat-bottomed. These boats take down wheat and other grain, fibres, lac, turmeric, horns, &c., and bring up cloth, spices, &c. The ordinary cost per mile for one ton by boat carriage is 1 anna 1½ pice, but for goods coming up stream the charge is about 1 anna 5 pies per mile. By steamer the charge is about 1 anna 2 pie per mile per ton."

In 1876-77 the river imports and exports of Sam-

† At Tiddi and Magardhokra, above the junction of the Kanhan coming from Kamthi, there are heavy falls and dangerous whirlpools.

balpur and Sironcha in connection with the Eastern coast are thus shown in the annual trade report:—

	Imports.		Exports.	
	Quantity in Maunds.	Value.	Quantity in Maunds.	Value.
Sambalpur	4,866	2,46,548	56,000	1,86,179
Sironcha	30,193	92,699	355	1,715

Grand schemes for the navigation of the Godavari have absolutely failed and have been abandoned, and nothing practicable has been suggested with regard to the navigation from Sambalpur to Cuttack.

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BOMBAY, SIND.

The Indus is the great highway of traffic in Sind. The Indus steam flotilla consists at present of 14 steamers and 36 barges, and the country craft registered by the Conservancy Department number between 4,000 and 5,000. The number registered in 1876-77, when river traffic was exceptionally active, was 4,655. These vessels consist of the "Zorak," a large boat built in the Punjab, and the common Sindhi boat. The former is an excellent cargo boat, sometimes of 70 or 80 tons; the latter ranges from six or seven to 60 tons. The charge for goods by steamer is on the average—

Up river	9.48 pies	Down river	6.27 pies
per ton per mile.			
By native craft the charge is—			
Up river	2½ pies	Down river	3 pies
per ton per mile.			

Cargo up river is not so easily obtainable by native craft as down river.

34. The remaining questions of Chapter I. seem to have no applicability to this province, and may therefore be passed over.

BOMBAY, SIND.

Colonel Haig.

MADRAS.

The main line of water communication in the presidency is the Buckingham Canal, which starts from the southern end of the Commamoor Canal in the Kistna district, and will, when completed, run right through the districts of Nellore, Chingleput, and South Arcot to Vedarnium in Tanjore. The total length of water carriage on this line, inclusive of the Commamoor Canal, will then be 598 miles, which may be divided into sections, as shown hereunder:—

	Miles.
From Cocanada fresh-water canals via Dowlaishvaram, Ellore, and Bezwada to the Junction lock of the Buckingham Canal	192
Buckingham Salt-water Canal.	
From Junction lock to Madras and Adyar (completed)	204
From Madras and Adyar to Markanum (completed)	65
From Markanum to Cuddalore (not completed)	37
From Cuddalore to Negapatam (portions completed)	68
From Negapatam to Vedarnium (completed)	32
Total distance from Cocanada to Vedarnium	598

It is expected that the Madras Irrigation Company will shortly complete their arrangements for navigation, and there will then be canal communication between Kurnool and Cuddapah. The other canal communications in the presidency may be said to be all local. In the Godavari district, besides the above-mentioned through canal, there are canals from Rajahmundry to Amalapur, Narsapur, Mogaltur, Samuleotta, Rajolu, Tanuku, and Coringa, besides some other minor navigable channels. All are connected with the Godavari anicut, and are regulated by means of locks. In the Kistna district, in addition to the Commamoor Canal, one runs from Bezwada to the port of Masulipatam, and another from Bezwada to the salt station and seaport of Nizampatam. A third canal is navigable for about 21 miles to Kollur. The canals in the Kistna district are usually closed for about three months in the year to clear out the silt.

The only other district in which there is any important canal communication is Malabar, where there are extensive natural backwaters running parallel to the coast, and joined by artificial channels forming three sections of coast canal not as yet connected with one another, viz. :—

	Miles.
From Cochin to Tirur	78
From Beypore to Badagara	43
From Boliapatam to the Canara frontier	22
Total	143

In Ganjam there is a short and not much used canal connecting the Chilka Lake with the port of Ganjam.

River navigation, to any extent worth speaking of, is confined to the Godavari and Kistna Rivers on the east coast, and to the numerous streams from the Western ghats, in the districts of Malabar and Canara, many of which skirt the coast for miles before actually turning into the sea. The Chilka Lake is a means of communication between Ganjam and Puri.

With reference to the kind of boats used, and their number, the nature of the traffic, &c., the collector of the Godavari gives somewhat indefinite information. He merely says, "Cargo and transit boats are used on them. They generally afford good accommodation. They carry passengers, and all sorts of cargo, paddy, cholam, ragi, and other articles of merchandise are brought in from the interior. These boats number about 3,000 or 4,000. The canals are all connected with the Godavari anicut, and are regulated by means of locks."

The collector of the Kistna is more explicit, and says:—"The superintending engineer estimates the number of boats plying in the Kistna and Godavari canals at no less than 2,000. They are of various descriptions, with a tonnage of from 5 to 40 tons. They carry both passengers and goods, but the greater number carry goods only. They are chiefly used for the carriage of grain and cotton, and there is also a constant passenger traffic. All boats using the canal are obliged to take out licenses or pay a special fee. The rates differ according as they are passenger or goods boats only, and of passenger boats there are two classes. The cost of carriage by boat is very much cheaper than by road, and may be taken at three pies and upwards per ton per mile."

The following particulars are taken from the Public Works Administration Report for 1877-78:—

Godavari District.

Passenger boats	-	120
Cargo boats	-	1,671
Value of cargoes	Rs. 36,965,022 (arbitrary valuation).	
Navigation receipts,	Rupees 44,927.	

Kistna District.

Passenger boats -	36
Cargo boats -	628
Value of cargoes 6,108,671 (arbitrary valuation).	
Navigation receipts, Rupees 17,184.	

The charge for boat licenses in the Godavari district was raised in 1877 from one rupee to two rupees a ton, and it is in contemplation to raise it in the Kistna when the result has been observed.

A copy of the rules and bye-laws will be found in the appendix.

From Nellore it is reported:—"The boats in use here are flat-bottomed, from 1 to 40 tons burden, with masts and sails. The boats generally used by passengers are called top-boats. They carry five tons. One-third of the deck is covered in with a waterproof planked roof and curtained with mats or cloth. Oil-seeds, chillies, grain, firewood, and various other kinds of produce are carried to and fro. During April and May and June the average monthly imports by the canal to Madras amounted to 20,000 tons, most of which went from this district. There are about 2,000 boats carrying about 15,000 tons on the canal, of which perhaps about 100 belong to this district, where most of the canal is new * * * * *

The ordinary cost per mile of boat carriage for one ton is about 3 pies, but it varies greatly now, because there are not sufficient boats to meet the demand. This will soon be remedied. Large cargo boats often carry at 2 pies per mile per ton."

The collector of Chingleput writes as regards his district:—"The use of the canals is chiefly to carry the salt manufactured by Government; a considerable quantity of firewood is carried, and some produce and dry fish; they are also much used for passenger traffic. The total number of boats on both canals is 1,311. Of these 437 are passenger and 874 cargo * * * * *. The ordinary cost of boat-carriage per mile for one ton is 5 pies." Mr. Price also appends a copy of the rules connected with the Northern Canal, and says that the southern are under the license system.

The canal communication in South Arcot is at present in such a transition state in connection with the southern extension of the Buckingham Canal that it is unnecessary to reproduce here the details given regarding existing boats and traffic.

With regard to the canal from Negapatam to Vedarnium, which at present is an isolated section, the collector of Tanjore writes:—"There are 34 boats (similar to sea-going cargo boats), and of size varying from 3 to 10 tons in capacity, engaged in carrying the salt and tobacco from Vedarnium, and a toll in the shape of a registration fee of 4 annas a year is levied on each boat plying on the canal. The cost of carriage of one ton is 6 pies per mile."

In Malabar the navigation of the artificial channels connecting the backwaters is under no regulation. There is only one substantially built lock at which a trifling fee is levied on all boats passing through it.

The above remarks have had reference chiefly to artificial canals. With regard to river navigation it may be stated that the Godavari is navigable, in reaches, for the greater part of the year throughout the whole length of the district above the anicut, and two large steamers are worked on it. Below the anicut it is permanently navigable as far as the tide goes, and up to the anicut during freshes. The Kistna is also navigable for a part of the year, but is very little used for the purpose.

In Malabar and Canara the rivers and backwaters are freely used for navigation, and, as already stated the natural facilities in the former district are supplemented by artificial channels so as to form a continuous line of coast canal. The collector of Canara writes:—"There is water communication between the sea coast and the interior by means of the numerous

"rivers which rise in the Western ghats. These rivers connect most of the seaports with the villages in the interior to some distance, and a brisk trade, chiefly consisting of rice, betel-nut, coconuts, and firewood, is carried to the coast. The merchandise is conveyed in boats of various sizes and capacities from $\frac{1}{2}$ a ton to $4\frac{1}{2}$ tons, according to the depth or shallowness of water in each river. The number of these boats amount to 3,794. The navigation is carried on under no regulation, and is not capable of improvement except at a heavy expenditure. The ordinary cost per mile of boat carriage for one ton is about 1 anna."

In Malabar the condition of river and backwater navigation are very similar. The collector has omitted to give the cost of carriage per ton, and his estimate of the number of boats, 1,994, seems unduly low. The artificial canals connecting the backwaters are not, as a rule, in a very efficient state.

With regard to improvements to the existing water communication the collector of Godavari refers to projected extensions, and the collector of Chingleput suggests the improvement of the existing navigation by the use of steam towing-boats and dredges, and the construction of proper landing wharves and basins. As regards the proposal to introduce steam tugs, the Board would observe that the essential advantage of a canal is its cheapness. Steam tugs involve increased expense, especially in this country, and, although increased speed might be obtained, it is in no way a desideratum under present circumstances. The extension of the Godavari system, and the other improvements referred to by Mr. Price, would no doubt be very desirable in themselves; but the Board have no data before them on which to form an opinion of their financial practicability. The collectors of Malabar and Canara advocate the completion of the West Coast Canal, for which the existing backwaters afford such great natural facilities, and if canal extension is to be carried on from provincial funds, as is now being done in the case of the Buckingham Canal, the Board consider that the West Coast Canal should be the work next taken in hand; but with the information at present before them, they are not prepared to offer an opinion as to whether the provincial funds available for communications can be best expended on roads or on canals.

In connection with the question of water communication, it may not be out of place to mention the facilities afforded to coasting traffic by the British India Steam Navigation Company, which carries on a weekly service in both directions between Calcutta and Bombay, calling at the under-mentioned ports in the Madras presidency:—

Gopaulpore.	Tuticorin.
Calingapatam.	Cochin.
Bimlipatam.	Bey pore.
Vizagapatam.	Calicut.
Cocanada.	Tellicherry.
Masulipatam.	Cannanore.
Madras.	Mangalore.
Negapatam.	

In the case of Calingapatam and Masulipatam, however, it is only every alternate steamer that calls, and the ports of Cochin, Bey pore, Calicut, Cannanore, Tellicherry, and Mangalore are frequently inaccessible during the prevalence of the south-west monsoon, and the steamers then stop at the small port of Narrakal, in the Cochin territory. In the case of Mangalore it may be said that the port is closed throughout the whole period of the monsoon.

In addition to the above there is a fortnightly service to and from Rangoon, calling regularly at the ports of Masulipatam, Cocanada, Vizagapatam, and Bimlipatam, and once a month at Calingapatam, Barwah, and Gopaulpore.

CHAPTER I.—QUESTION 21.

Is there any portion of your province into which, by reason of the want or the badness of the roads or other means of access, or of local or temporary disturbing causes of weather, &c., it might be impossible or difficult for unassisted trade in time of scarcity to throw enough grain to feed (say) one-quarter of the population for six months? If there is such a part, state where it is, what is its area and population, and what are the special difficulties to be overcome, and how they might best be removed?

PUNJAB.

PUNJAB.

Major Wace.

The principal difficulty in answering this question for the Punjab is, that the records of the years 1860-61 and 1868-69 (the years of famine in the Punjab) go to show that, partly owing to the movements of people towards the centres of trade and towards the tracts least famine-stricken, and partly owing to the activity of trade and carriage, a failure of food supplies, such as the question contemplates, is unlikely in any part of this province.

It is clearly unnecessary to consider the question in respect of the districts traversed by and immediately adjoining the railway lines. But it may be of use to give the data which justify the assumption of the sufficiency of trade to import a half-year's food for a quarter of the population in the tracts more distant from the railway; viz., (1) the Hissar division, and (2) the Derajat division and Jhang district.

- (1.) Of the Hissar division the population is 1,232,435 souls. A fourth of this population, consuming, at famine rations, say $\frac{1}{2}$ ser per head per diem, would require a daily supply of say 4,000 maunds per diem. Delhi is 10 marches from Hissar, and Sirsa is a similar distance from Ferozepore and the Sutlej. On an average, we may assume that a camel would deliver at the various points in the division where grain was wanted two loads in a month, 4,000 maunds, equal 800 camel loads, or say 1,000. So we should need 15,000 camels. The Hissar division alone possesses over 25,000

camels, and over 11,000 carts. The latter will carry on the worst road twice as much as a camel.

- (2.) The aggregate population of the Derajat division and Jhang district is 1,339,278. A fourth of the population would consume (at the same rate as above) say 4,200 maunds per diem. As Dera Ismail Khan is 12 marches from Mooltan, the amount of carriage required would be a little more than in the previous case, say 20,000 camels. The Derajat and Mooltan divisions together possess 28,000 camels; and, besides these, river carriage by native boats would certainly be largely used.

- (3.) A third possible case can be suggested; viz., such a very unusual failure of autumn crops as occurred in 1877 in the hill tracts of Hazara. The population of these tracts (tahsils Abbottabad and Mansahra) is 227,561; a fourth of this population would consume, at above rate, say 750 maunds per diem. With camels delivering from Rawalpindi two loads a month, about 2,850 camels would be needed to keep up the required supply. The adjacent district of Rawalpindi alone possesses 7,600 camels. Camels can work on the main roads of Hazara.

It seems unnecessary to enter into further calculations on this subject.

NORTH-WESTERN PROVINCES AND OUDH.

NORTH-WESTERN PROVINCES AND OUDH.

Mr. Bux.

A road map has been prepared in which those areas are marked off and coloured grey which appear from the district officers' replies to be more or less cut off from communication with the rest of the provinces for some portion of the year; on each tract its area (in square miles), and population have been marked, if it has been possible to ascertain these from the district reply or any other source (such as settlement reports). The condition of each of these tracts will be noticed separately, and any proposals will be quoted which have been made by the district officer for improvement of its communications. All the tracts lie on the borders of the provinces in country either hilly or close under hills, and intersected by streams and torrents, which make the maintenance of practicable roads extremely difficult. It is in the rainy season, when the streams are full, that the communications are interrupted; at other times of the year it would appear that all of the tracts are more or less accessible.

The distribution of these tracts, as marked on the map, is very irregular. The Gonda district, for instance, is represented as being furnished with good communications right up to the Nepal boundary, and it interrupts a line of country inaccessible in the rains, which runs from Gorakhpur to Sitapur. These irregularities are probably due in some part to the different meanings attached to query 21 by different officers, as well as to differences in the condition of neighbouring districts. It is known, for instance, that a certain portion of the Bijnor district is quite cut off in the rains from all communications with either the

rest of Bijnor or the Saharanpur district, though this has not been noticed by the collector.

As to the peculiar conditions of the different tracts which have been marked on the map as insufficiently connected with the rest of the provinces, it will be sufficient to quote the remarks of the district officer within whose district each is situated.

"*Lalitpur.*—The means of communication, as regards the interior of the district, are good. There is one metalled and bridged road running through it from north to south, and the trading towns, such as they are, are connected by good fair-weather roads. As regards communication with other districts, nothing could be worse. To the north the district is bounded by the River Betwa, an unbridged mountain stream. Across this there is a causeway at Jherrar by which all traffic passes from November till June, but, as soon as the river gets flooded, it is impassable at this point, and traffic then goes by an unmetalled road via Siras ghat, where there are boats. By the metalled road crossing the river at Jherrar, Jhansi is 57 miles from Lalitpur town; by the Siras it is 63 miles, of which seven miles from Talbhat to Siras are unmetalled, and in some parts unbridged. But even the Siras crossing is not at all times practicable, and all traffic is occasionally closed for a week or 10 days at a time by the flooding of the river. This flooding is not governed by local rains, but by the rains in Bhopal, so that it is impossible to be sure at any time in the rains whether the river is passable or not.

"To the south this road is metalled and bridged as far as Bhileau ghat on the boundary of this district, but beyond it as far as Saugor, 43 miles, the road exists in name only, and is utterly impassable for wheeled traffic after the first fall of rain, the soil being within a few miles of Saugor black cotton. I have before urged the expediency of metalling this road, for from the Saugor district comes our supply of wheat, barley, gram, &c.

"Should it not be considered expedient to metal this road, and the Central provinces Government is, I believe, not inclined to do the work, justly arguing that the Central provinces would get no benefit therefrom, I would suggest that a good road should be run to Balabhat in this district, leaving the Jhansi and Saugor metalled road some four miles north of Gonah, and continued in the Saugor district to Khemlasa and Khorei, the great grain and cattle markets. Were this done, Lalitpur would be safe, as far as supplies of food go, as long as the Saugor district were not attacked by famine. In 1869 I had to get grain for Jhansi, at Colonel Lloyd's request, from the Saugor district during the rain, and it had to be brought up by camels, &c., and then with great difficulty, owing to the want of a good road.

"Mirzapur.—The portion of the Mirzapur district known as the Robertsganj tahsil, containing an area of 2,632 square miles and a population of 173,540, is awkwardly situated for drawing its supplies from other sources in case of local failure of grain supply.

"Its boundary extends some 100 miles south of Mirzapur and Chunár, the nearest points on the line of railway.

"The traffic is carried on entirely by means of pack-bullocks.

"As a rule, it never imports grain for its own use, but brinjaras bring grain from Sarguja, Rattanpur, and the south, which is again re-exported northward.

"Grain is generally cheaper in Robertsganj than in other tahsils, owing to the excessive cost of carriage by pack-bullocks.

"To endeavour to import food grain into this portion of the district in the event of great scarcity would be very difficult, and probably private enterprise would fail altogether.

"If assistance were given by Government, however, the difficulties could be overcome. The population is thin, being only 66 to the square mile; the inhabitants are entirely agricultural, of low caste, and very poor. To a large extent they support themselves upon the produce of the forest and jungles; and should the crops in the neighbouring districts of Surguja and Palamau prove good, supplies would come to them from that quarter.

"Gorakhpur.—There is such a tract in the north of this district.

"It lies north of the Maharájganj tahsil, under the taráí, and is some 25 miles broad by 18 miles deep, containing an area of some 450 square miles.

"It is without road or any means of access save footpaths and the roughest cart tracks, and the Rohin river.

"Owing to the rising of the river and the absence of communications it might at some time be impossible for unassisted trade to throw enough grain into this part to feed a portion of the population, if food utterly failed.

"Such a fear was entertained in 1874, and advances were given by Government for grain to be stored there, but eventually the grain in the markets, or supplied by means of relief works, was found to be sufficient during that distress.

"This part of the district requires development, and one of my proposals was (in case of relief works on a large scale being required this year) to open a new road right through the centre of this tract from the Maharájganj tahsil via Chauk (a Government forest depôt, and Sakwi, a timber depôt on the Rohin) to Deoghát on the Nepaul frontier under the large

Nepal forest of Hardi Girma. This road would be about 31 miles long, and would be of the greatest benefit to this portion of the district, besides developing the timber trade with Nepal.

"Basti.—The northern garganas must be inaccessible in bad weather to trading operations of any magnitude, suffering, like other sub-Himalyan tracts, from the want of bridges. All such tracts are much cut up by hill streams. Writing of tappa Galaur the Settlement Officer remarks, 'The villages are almost all cut off from each other and from those in the neighbourhood by streams or jhils, which are only fordable here and there.'

"Yet, as I have pointed out elsewhere, the timber from which every one of these streams might be cheaply and efficiently bridged grows close at hand in the Government forests. If, however, a district officer wishes to bridge a stream he has to draw out an estimate, in which every log of wood has to be charged (though procured from the Forest Department) at the rates levied by private firms. These sub-montane districts are the largest of all, yet, having much waste and jungle land included in their area, their local funds are very poor, considering the great extent of roadways which have to be kept up. Consequently, the estimate when made up is but too often found to be higher than what the local funds can afford. No one beyond the district limits seems to be able to appreciate that insistence on money payments in such cases leads to no actual gain to Government, while on the other hand all the indirect gain from public improvements is lost. Government is most anxious to improve trade with Nepal, to prevent famine by improving communications, to open out waste lands, and to prove itself generally a Government of progress; yet when it comes to the point of using one part of its property to improve another, red tapeism is allowed to step in, and with illusory figures to bar the way; the trees grow on to rot and die, while the rivers go on unbridged for ever. Our engineers, too, have an overweening partiality for masonry bridges in preference to those of wood, though in the parts I write of clay and lime are scarce. Sal wood will last at least 100 years, and with skill in design wooden bridges can be adapted to any stream, however rapid.

"District officers should be allowed to indent without payment on the Government forests for any timber required for the bridging of public roads, and, properly worked, such an order ought to give a great stimulus to the traffic in frontier districts.

"Otherwise Government forests ought to be charged with cesses according to their areas, in common with the other revenue-paying portions of the districts, and at the same rates as average revenue paid on cultivation.

"Bahraich.—There are tracts in the north of the district into which it would, at present, be extremely difficult in time of scarcity to throw grain. These are the parganas of Dharmanpur and Tulsipur, and the taráí villages of parganas Bhinga and Ikauna, area in acres—malguzari 226,131 and forest 22,355, total 451,486; number of villages 171 and population 66,178. The roads are merely fair-weather (surface) ones, and rivers presenting more or less difficulties to crossing intervene. In these tracts rice is extensively cultivated, and when drought occurs the people are sometimes in serious straits.

"This was the case in 1873, when the trans-Rapti tract suffered severely.

"The proposed railway from Bahramghát to Bahraich and from the eastern districts to Bahraich will, if supplemented by improved feeder roads, much lessen the danger, and at the same time immensely increase the value and cultivation of these tracts. Moreover, if the trade with Nepal should increase, the expediency of extending the Bahramghát-Bahraich Railway to Nanpara might be considered.

"Sitapur.—There is a tract like the one described in the country between the Chauk (Sánda) and the Gogra, an area of about 400 square miles. To make

the roads passable in the rains they would have to be raised and metalled, and numerous drain bridges made. The rivers Chauka, Ul, and Kewáni are too broad to be bridged.

"Kumaun.—There is one portion of the district which would be greatly assisted in times of scarcity by the existence of a cart road. It is that lying along the border of Garhwál, and comprises the parganas of Pálipacháun and Dánpur. The same road would also materially assist the parts of Garhwál coterminous with the above parganas. This road would run from Rámnagar via Mohán up the valley of the Rámanga as far as Gunai, and by it grain could be conveyed to a spot very central for the people of both Kumaun and Garhwál; for if famine ever should occur in these hills the most critical time would be the hot months and the rains. During the cold season the people can go to the Bhábar and procure grain for themselves, but during the rest of the year the Bhábar is very unhealthy for all but persons acclimatised, and men from the higher hills would sooner die of starvation than go there. A cart road to Gunai would allow of grain being stored at a spot where all the people could go to purchase it without fear of sickness. It would not be a costly work, as a great part of the line would be up the valley of the Rámanga, where it could be cheaply made.

"Garhwál.—Garhwál wants two iron bridges, and until they are constructed the district is isolated from the plains during the rains and sometimes even in winter. These two bridges—one over the Nayar and the other over the Koh river—should be erected at once, for until they are a serious season of drought might cause immense loss of life to an isolated population; and as the road which crosses these two rivers is our sole postal line and trade route for the plains, it is necessary to enlarge on the necessity for immediate action.

"It would be quite impossible for unassisted trade until the rivers Nayar and Koh are bridged to throw enough to feed a quarter of the population of Garhwál for six months into this district. If scarcity appeared, and the Nayar and Koh rivers were in flood, no traffic could approach the points where food would be most needed. In an isolated district of about 5,500 square miles and a population of about 310,282 people, it is not easy to point out any particular area or portion of the population which would suffer most;

I would say generally the parganas to the south of the Almora road, as they are most liable to drought and furthest away from the main lines of communication."

There is, then, but a very small area of these provinces which is so badly provided with communication as to be altogether cut off from the outside during any portion of the year. But if in this area is to be included every tract into which it would be difficult or impossible to throw enough grain to feed one-quarter of the population for six months, it would comprehend some other portions of the provinces which are at considerable distances from railway communication. When the distance to be traversed by road is short, and there is a sufficient store of grain to draw upon, it would seem that ordinary district carts could transport the amount required. The Bijnor district is some 30 miles from the Muzaffarnagar station on the Sind, Pánjab, and Delhi Railway, with which it is connected by two second-class roads. Muzaffarnagar is one of the chief grain marts in the provinces, and collected grain in large quantities from the Pánjab during the past scarcity. The population of the Bijnor district is, roughly speaking, 774,000, and at the rate of 18 ounces per head per diem, it would require about 17,750 tons of grain at least to feed one-quarter of this population for six months. This is equal to some 4,80,008 maunds. During the year ending 31st March 1878 (six months of which were identical with the period of the greatest distress in Rohilkhand) the amount of grain which crossed the Ganges from the Muzaffarnagar into the Bijnor district by the two chief ferries was over 1,200,000 maunds. Nearly all this must have travelled between 30 to 40 miles by cart before it reached the Bijnor district. It is believed that some 4,00,000 maunds at least of this merely passed through a portion of the Bijnor district on its way to the neighbouring district of Moradabad, and another large portion was also en route for the Taráí and hill districts. But the figures show that, given a railway to collect it, grain can be transported for a distance of at least 30 miles in almost any quantity required, provided that there is a good road for it to travel on, and that there is a sufficient number of carts available. The last condition will only exist on roads which are always lines of considerable traffic; such as the roads between the Doab and Rohilkhand are.

BENGAL.

Inaccessible Tracts.—It may be stated generally, that since communication with Orissa was opened by sea there is no part of Bengal into which enough food could not be thrown to meet any wants the occurrence of which is within the range of probability. Whether or not private trade could in all cases do what was needful without the assistance of Government, it is impossible to say. It would depend on such a vast number and variety of circumstances as could not possibly be predicated. Trade in Bengal has a tendency to confine itself to old and stereotyped routes, but when new routes are opened out it is not slow to take advantage of them. Its ramifications extend to all parts of the province, and there is no district which is not, in some way or another, already connected with the great trade routes described in the answer to questions 18, 19, and 20.

There is some central point in or near every district in Bengal to which private trade, unassisted, would in general be able to bring such food as was required, and the people who required it could safely be trusted to manage its internal distribution in all but very exceptional circumstances. A universal failure of the crops over the whole province would, of course, completely paralyse private trade; but such a contingency is not within the range of probability. It may be said that since the introduction of the Road Cess Act every district officer has it in his own power to remove any difficulties of transport that formerly existed. This cannot be done in a day, but it is being done gradually, and no special measures are called for at present to meet a future possibility.

I. QN. 21.

CENTRAL PROVINCES
& OUDH.

Nicholls.

CENTRAL PROVINCES.

The answer would depend almost entirely, first, on the distance from which supplies would have to be drawn, and, secondly, on the power of the people, as estimated by traders, to purchase supplies if brought into the distressed locality. I will leave out of the question at present the feudatory states. Looking first at the zemindari estates, and the chindwara jaghir estates, and the similar wild tracts of rajaborari and kalibhit in the Satpura hills, under Kurku Chiefs, it may be said that there are no traders who would be at all likely to engage to any appreciable extent in the importation of grain.

But, on the other hand, experience has shown us that the inhabitants of nearly all these tracts, what with their readiness to move to more fortunate localities and the resources which they possess in themselves and in their knowledge of the life-sustaining products of their forests, are practically independent of foreign importations, at least of large importations. And this holds good of nearly all the wild parts of the khalsa of Mandla, Balaghat, Bhandara, and Chanda.

For the rest of these four districts unassisted trade might be relied on, provided that the traders could procure grain at the nearest points on the railway, or in the west of Chhattisgarh, at such prices as would enable them to retail at home at rates which were not beyond the purchasing power of the people.

The districts of Nimar, Hoshangabad, Narsinghpur and Jubbulpore, Betul, Chhindwara, Seoni, Nagpur, and Wardha also are, in this respect, safe. I think Saugor and Damoh, even in the northern parts, would be safe, if the home population alone had to be considered. But these parts are liable to be called on to support the strain of feeding no inconsiderable portion of the population of many native states of Baghalkand and Brundelkand, together with probably some thousands of people from Lallupur and Jhansi, or parts of Central India lying further west. Such a task would probably not be adequately provided for by the local traders.

I think such pressure could hardly be imagined as coming at the time of the year when stocks are lowest and the roads impassable, that is to say in the rainy season, because naturally the kharif crops would never come into the market before the close of the rains, and traders regulate their stocks and operations on this knowledge.

I have previously said that Sironcha, a sub-division of the Chanda district, on the Godavari, 130 miles below Chanda, is very isolated. Much of the population is self-reliant. There is some water communication. Its trade lies chiefly with the opposite districts in the Nizam's dominions, and unless these were severely stricken at the same time unassisted trade might be reckoned on to bring in the requisite food, but at what cost I am not prepared to estimate. I must also suppose that there are on the Nizam's side no artificial restrictions, no prohibition of exports, and no prohibitive transit duties. The area which could not be considered self-reliant in respect of its supplies of jungle produce would not exceed 300 square miles, with a population of few thousands. The difficulty lies in its isolation. On the north it is bordered by the vast wilderness of Bustar, the navigation of the Godavari is rendered difficult by the triple barriers across that river which cut it off from the rich Delta country and the sea coast; and on the north-west, up the Pranheta country, it is separated from any large tracts of cultivation by the forests of Ahiri. But on the opposite side of the Godavari the districts of his Highness the Nizam, lying north and north-west of Warangol, abound in great irrigation tanks, and are perhaps safer than any other part of the Deccan against famine from drought.

Coming next to Sambalpur, the question is whether, irrespective of existing stocks, unassisted trade could lay down enough food to support for six months one-quarter of the population of the khalsa. To this might perhaps be added the probable requirements of the Chanderpur zemindari, also of Phuljhar, and the feudatory states of Raigarh and Sarangarh. But we have already seen migration and resort to the forests pull the people of these states and zemindaris through a total loss of their staple crop.

Returning to the khalsa, with its 1,770 square miles and 90,756 inhabitants, it is required to lay down 8,500 tons of rice. Until the failure of the bahal and berna rice lands is pretty sure, there cannot, I imagine, arise any necessity for importation by traders. The requirements would be 1,400 tons a month, to be brought at a time when the river is lowest. The total carrying power of the boats enumerated by Major Scott is 26,000 maunds, of which a third part could not be employed at the time of the year when wanted. It would be unsafe to calculate on more than one trip from Cuttack to Sambalpur and back in a month.

The district is land-locked and isolated.

Distances are—

Bilaspur - - - -	144
Seorinarain - - - -	105
Raipur - - - -	170
Cuttack - - - -	150

At present these are the only practical routes by which grain could be obtained in any considerable quantities. It may be assumed that the same unfavourable season which necessitates import into Sambalpur will affect in an equally disastrous degree either Cuttack or Chhattisgarh or both.

But supposing that both Cuttack and Chhattisgarh could supply the requisite grain, it unfortunately happens that Sambalpur has not the requisite carts and cattle for the land carriage, or boats for the river traffic. River communication with Chhattisgarh at this time of the year would be practically impossible, and the quantity which could be brought up the river from Cuttack by the existing boats would be quite inadequate. Until, in the course of time, from the increase of ordinary traffic between Cuttack and Sambalpur, the number of boats is vastly increased, no great alteration can be expected. The land carriage of Chhattisgarh is now fully occupied in other directions; to the westward; to the eastern coast through Kalahandi and Karriar, to Jubbulpore through Mandla, and to Mirzapur through Rewah, the available brinjara are generally fully engaged.

Therefore, I conclude that, even if we assume the traders had the will to import and the money to purchase, they would not be able to import without Government aid (and probably not even with such aid) six months' provisions for a quarter part of the population, 90,750 people, month by month, on a sudden requisition or emergency.

As for remedies, perhaps the navigation of the Mahanadi might be somewhat improved; the roads towards Cuttack, towards Midnapur and Ranchi, might be improved. The road to Binka, 28 miles south of Sambalpur, on the river, to which point the navigation is more free, might be advantageously improved. The advent of the railway to the western portal of Chhattisgarh at Kallianpur will set free much of the land carriage of Raipur and Bilaspur, and this, with the progressing improvement of the road from Jubbulpore through Mandla towards Bilaspur, will tend to decrease the employment of brinjara tandas in the carrying trade towards Jubbulpore and Mirzapur.

At present, and until the railway from Nagpur to Killianpur shall have been completed, Chhattisgarh will remain a land-locked country, an "Orissa without a sea-board."

In Chhattisgarh proper the khalsa area is 11,086 square miles, with a population of 1,752,362.

It is required to bring into it, on a sudden emergency, 3,942,814 maunds or 146,030 tons of grain, or at the best 657,138 maunds or 24,340 tons, month by month. It could draw almost nothing from Bastar, little from the eastern coast, less from Korea and Sirgujan and Mirzapur on the north; it must depend on its imports from Jubbulpore, and from the valley of the Weinganga and the more dis-

tant railway at Nagpur. The Sambalpur district might perhaps be able to help, but this could not be assured. The available carriage seems to be quite inadequate, at any rate towards the east of the Raipur and nearly all the Bilaspur district. The remedy is in the opening of the railway to Kallianpur, and if this railway were connected with Jubbulpore it would be all the more effective. It will be unnecessary to give my detailed calculation on this subject.

BERAR.

Mr. Dunlop.—In the greater portion of the Wun district, but more particularly in the south, owing to the want of roads it would be impossible in time of scarcity to throw enough grain to feed one-quarter of the population for six months. In dry weather it might be done with difficulty, but in the rains it would be impossible.

The only way to remedy this is by constructing good roads traversable at all seasons of the year. At present there are only 29 miles of finished road (and that has an unbridged river in the middle) in the 3,907 square miles of which this district consists. Whilst such a state of things continues the people

can fairly complain that in the event of famine they are cut off from all chance of escape.

The population of the Wun district, according to the census of 1867, but allowing for subsequent territorial changes, is 323,762 persons.

Mr. Jones.—In speaking of the south of Wun as isolated, Mr. Dunlop has forgotten the Wurdah Valley State Railway, the terminus of which, Wurora, is within 12 miles of Wun itself. This, with a road now about to be constructed in the interior, will make Wun as safe as any other part of Berar.

BOMBAY.

In most of the Bombay districts no difficulty is anticipated in throwing enough grain into any part of them to feed one-quarter of the people for six months by means of unassisted trade. At the same time, better communications would make the process much cheaper and easier, and lessen the danger of a break-down from failure of carriage or forage.

The exceptions are—

*In Kaladgi.**—The five talukas lying south of the Done nullah, viz. Badami, Bagalkot, Hungund, Mudibhehal, and Bagewadi. Grain going to them from the railway has to pass the Done nullah and the river

Krishna (unbridged), and the roads are very bad. A railway would entirely remove the difficulty.

In Dharwar.—The northern black-soil talukas Rón, Naolgund, and Gadak. The difficulties to be overcome are—(1) the distance from the coast, Rón being 150 miles from Carwar; (2) there is no metalled road leading either from Hubli or Gadak northward to Naolgund or Rón. In heavy rain the tracks over the black-soil become impassable.

In Ratnagiri.—The Mandargah petta on the Savitri river, and the Salshi mahal of the Deogarh taluka, to which it is difficult to transport supplies in the monsoon only. They could be relieved by Government agency.

*Area, 3,199 square miles. Population, 524,453.

MADRAS.

The collectors of Bellary, Cuddapah, Kurnool, North Arcot, South Arcot, Chingleput, Tanjore, Trichinopoly, and Salem are distinctly of opinion that as regards their districts this question should be answered in the negative. The collector of Bellary, which was one of the districts that suffered most severely during the recent famine, writes as follows:—

"The experience of 1877 has been amply sufficient to prove in the clearest manner that there is no part of this district into which it would be difficult or impossible for unassisted trade to throw sufficient food to feed one-quarter of the population for six months. Much stress is laid on this answer, as prior to 1876 this was not thought to be the case."

The collector of Ganjam writes:—"There might be a difficulty about sending grain into the Maliahs or the wilder parts of Goomsur along the hills in this district. But the population is so sparse there, and they are so accustomed to eke out their food by roots, leaves, &c., that I doubt famine ever being very bad amongst them; and, except in the case of the Maliah people, it would always be simplest to make them come for their food. A famine in the Maliahs, if possible (it is most improbable), could only be dealt with by making depôts of food at the most accessible places above ghauts, and directing the people to come for it there."

The collector of Vizagapatam does not reply to the question, but the Board infer from his other replies that he would answer it in the negative.

In the Godavari there are certain jungle-tracts in which it might be difficult to throw in enough grain to feed one-quarter of the population for six months, and the collector very much doubts, if unassisted, trade would offer to attempt it.

Though the collector of the Kistna district considers that the answer to the question should be "no," he adds, "At the same time such a necessity may arise, but for a much more limited period. At the commencement of the period of famine in a district like this, where road communication is very imperfect, difficulty will always be felt for a limited period, even amongst people who have plenty of money. There is always a panic when famine sets in, and the merchants in the large market towns whence the country supplies are drawn refuse to export supplies by cart through fear of loots." The above extract is sufficient to show that the considerations which have induced the collector to qualify his answer are altogether outside the question of means of access.

Mr. Grose, the collector of Nellore, says:—"I do not think there is any one tract in this district so isolated as is described; but if all the western tracts which are most remote from the sea had to be supplied at once, I doubt if carts enough could

CHAP. I. QN. 21.

CENTRAL PROVINCES.

Mr. Nicholls.

BERAR.

Mr. Dunlop.

Mr. Jones.

BOMBAY.

Mr. Peile.

MADRAS.

Board of Revenue.

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MADRAS.

Board of
Revenue.

"be secured. It must be remembered, too, that famine is usually accompanied by drought, so that cattle have no pasture, and grain cannot be moved freely in carts. During the last famine cart traffic was almost suspended from December till the cyclone in May."

The collector of Madura considers that all parts of the district are accessible to cart or wheeled traffic, but difficulty is experienced during the rains.

From the Coimbatore district the collector reports that the Collegal taluk, with a population of 90,830, is the only part of the district into which it would be difficult for unassisted trade to throw grain in time of scarcity; and, as distance and bad roads have to be overcome, and rivers have to be crossed, he proposes one good metalled road, bridged where necessary, from Erode to Cusbah Collegal. The Board have to observe that the collector has not been taken into consideration the roads in the Mysore plateau on which Collegal is situated.

The Commissioner of the Nilgiris anticipates difficulty in supplying the South-east Wynaad under certain circumstances; but he adds, "With the numerous ghats total cessation of supplies and consequent starvation could hardly result."

The collector of Tinnevely does not think there is any village in the district into which there would be a difficulty of throwing in supplies in times of drought, although there are many that are very inaccessible during the monsoon.

The collector of Malabar is of opinion that there might be difficulty in throwing supplies into parts of the Wynaad, and into the Attapadi Valley, but considers that the difficulty is not likely to be insurmountable or even considerable.

The collector of Canara alludes to the closing of the ports and difficulty of moving grain in any part of the district during the heavy rains from June to September, and proposes a railway from Bangalore and a canal up the coast. The Board have no doubt that

the country generally would be very much benefited by the proposed railway and canal, but they cannot look upon them as urgently called for for the purpose contemplated by this particular question. A famine in Canara is a contingency so remote that it would be wasteful to spend money in precautions against it; and even if one were to occur the out-turn of the crops is known early in the year, and as the people are in the habit of laying in their stocks before the monsoon commences, it is then, when the ports are open, and not during the heavy monsoon, that private trade would exert itself.

Speaking generally of the presidency, the Board would say that, assuming private trade to be active and energetic, and confining themselves to considerations of means of access alone, there is no portion of the presidency into which grain could not be thrown by unassisted private trade in times of local scarcity. Difficulties undoubtedly would arise, but only such as could speedily be removed by the agency of the Local Fund Boards, who are now charged with the administration of the communications of the country. The isolation which it would be really difficult to meet would be that arising under circumstances similar to those noticed by Mr. Grose, viz., the isolation of the more remote portions of large famine-stricken tracts to which grain had to be brought from long distances with the means of cart carriage paralysed by want of pasturage. Nothing can remedy this but the development of the railway system.

In sparsely populated hill tracts such as those alluded to by the collectors of the Godavery, Ganjam, and Vizagapatam districts, the inducements offered to private trade are not such as to make it likely that it could be relied on in times of scarcity, but Government grain could be thrown in to central depôts to which the hill people could come and fetch it.

CENTRAL INDIA.

CENTRAL
INDIA.

Mr. Winger.

Baghelkhand.—The Sohagpur tract is 150 miles from the nearest railway station. The Kaimur hills lie across the direct route, and there are no roads. But pack-bullocks are used, and, the population being

sparse, difficulty would only be experienced during the rains. There may be better communication with the Chota Nagpur side.

CHAPTER I.—QUESTION 22.

To what extent has telegraph communication been established between the chief towns of your province? Having in view the value of rapid communication in time of distress, are there any important lines which it might be desirable to construct?

PUNJAB.

Major Wace.

The Punjab is in telegraphic communication with the rest of India by two lines; of which one leaves the province at Delhi, and the other at Mooltan. The former directly connects the Punjab with the North-Western Provinces and Calcutta; the latter with Sind and Bombay. In the interior of the province the telegraph system consists of three principal lines. The first follows the railway line from Delhi

PUNJAB.

to Lahore and Jhelum, and then by the trunk road to Peshawar. The second follows the railway line from Lahore to Mooltan and Sakkar, in Sind. The third, starting from Sakkar (Rohri), in Sind, connects all the frontier stations on the west bank of the Indus northward to Kohat, where it is again connected with the first line at Rawalpindi, adding in the branch lines, viz., the branch connections with Rewari, Simla,

Pattiala, Ferozepore, Dalhousie, Siálkot, Murrero, and Abbottabad; the total mileage of telegraph lines in the province is:—

	Miles.
(1.) Main line Delhi to Peshawar -	628
Branches—Delhi to Rewari (Rájpu- tána State Railway) -	51
Umballa to Pattiala -	37
Do. Simla -	79
Ludhiána to Ferozepore -	77
Amritsar to Dalhousie -	117
Wazirabad to Siálkot -	25
Rawalpindi to Murree -	39.5
Kala-ke-Serai near Rawalpindi to Abbottabad -	44
(2.) Main line, Lahore via Mooltan to Sakkar, in Sind -	492.5
(3.) Main line, Sakkar to Kohat up the west bank of the Indus, and thence to Rawalpindi -	404
Total miles	1,994

All this is permanent line. I have not reckoned a few purely temporary lines, now working mainly for military purposes.

By this system 23 out of 32 districts are in direct telegraphic communication both with Government and with the Commissioners of divisions. The nine districts lacking such communication are:—

- (1.) Karnal, in the Delhi division, distant by metalled road 74 miles from Delhi and 47 miles from Umballa. The postal communication is by horsed carts and metalled road, which run in 13 hours from Delhi to Karnal, and in eight hours from Karnal to Umballa.

NORTH-WESTERN PROVINCES.

The East Indian Railway and the Oudh and Rohilkhand Railway, supplemented by the telegraphic offices at military stations like Sitapur, supply a fair number of telegraphic stations for the general events of the province, but for times of distress it is most desirable that every civil station should be in telegraphic communication with the rest of India.

The following stations have no telegraphic office:—Jhansi, Lalitpur, Jalaun, Budaun, Mainpuri, Kheri, Bahraich, Gondah, Basti, Gorakhpur, Rae Bareilly, Sultanpur, Partabgarh, Garhwal, and the Tarai. Hamirpur, Banda, Bijnor, and Azamgarh are probably also without them, but the officers of those districts have so far given no information.

NORTH-
WESTERN
PROVINCES.Captain
Pitcher.

BENGAL.

The province is very well provided with telegraphic communication. In the province of Behar, including the two Commissionerships of Patna and Bhagalpur, and containing 12 districts, there is direct telegraphic communication with the head-quarters of all districts except Saran, Malda, and the Santhal pergunnahs. They are accessible from telegraph stations on the East-Indian Railway. The telegraph to Gya is under construction.

In Orissa, out of three districts, only Purie is unprovided with a telegraph station, but it is only one night's post from Cuttack. A new line has lately been constructed to connect Cuttack with False Point. In Chota Nagpore, out of four districts, Hazaribagh is the only one provided with a telegraph station.

In the Chittagong division two districts out of three are in direct communication with Calcutta and each other. The exception is the Chittagong hill tracts.

In the Dacca division only two out of five districts have direct communication by telegraph. In the Faridpur district there is a telegraph station at

Goalundo; only Backerganj and Mymensingh are entirely without telegraphic communication.

In the Rajshahai division Darjiling and Jalpaigori are in direct communication; the telegraph line on the Northern Bengal State Railway runs through all the other five districts, though they have not telegraph stations at their head-quarters.

In the Presidency division the only telegraph station is at Calcutta; Nadiya and Jessore can be reached from the Eastern Bengal Railway telegraph, and Murshidabad from the Azimganj Railway station.

Of the five districts of the Bardwan division three have telegraph stations; Bankura and Birbhum have not, but there is a telegraph station at Rani-ganj, a sub-division of the former, and Suri, the head-quarters station of the Birbhum district, is only 7 miles from the nearest telegraph station on the East Indian Railway.

Considering the existing postal facilities, and the fact that the districts hitherto most subject to famine are all already provided with telegraphic communica-

BENGAL.

Mr. Toynbee.

CHAP. I. QN. 22.
BENGAL.
Mr. Toynbee.

tion, except Saran, and that it is easily accessible from Arrah, it cannot be said that any additional telegraph lines are required in Bengal to meet the necessities of future famine administration. All the most important towns in the province are connected with each other and with Calcutta by telegraphic communication, and such lines as have any prospect at all of financial success have already been constructed. To sum up, 22 out of 43 districts in Bengal have

telegraph stations at their head-quarters, 12 have lines of telegraph running through them, and more or less accessible to post or special messenger, while only nine are wholly unprovided with telegraphic communication, viz., Manbhum, Singbhum, Lohardagga, Puri, Maldah, Saran, Chittagong hill tracts, Backerganj, and Mymensingh. All these are within easy postal distance of the nearest telegraph station.

CENTRAL PROVINCES.

CENTRAL
PROVINCES.
Mr. Nicholls.

The existing telegraph lines follow the open lines of railway. The military station and important trading town of Kamptee is connected with the railway lines at Nagpur, 10 miles distant. This line is continued through Seoni to Jabulpore, having a total length of 174 miles. Saugor is distant 75 miles from Kureli on the G. I. P. R., and a telegraph line runs beside the military road, connecting these points. The fortress of Assirgarh is distant 6 miles from the telegraph. The military posts and commercial towns of Raipur, Sambalpur, Hoshangabad, and Chanda, besides Sironcha, are not connected, nor is Pachmarhi, a military post and the sanitarium and hot-weather residence of the Chief Commissioner and staff. Hoshangabad, a military post on the frontier of the

provinces, the crossing place for much of the Bhopal produce over the Nerbudda, and the head-quarters of a Commissioner of division, is distant 10 miles from the railway and telegraph lines. But the new railway would take the telegraph to Kallianpur, 50 miles distant from Raipur, the head-quarters of the Commissioner of the Chhattisgarh division.

Assuming that the telegraph will follow the railway to Kallianpur, the portal of Chhattisgarh, probably commercial and military considerations, over and above the considerations here referred to, would necessitate an extension to Raipur. On general grounds, extensions to Pachmarhi, and perhaps to Chanda, are eminently desirable. A line to Pachmarhi has, I understand, been sanctioned:

BOMBAY.

BOMBAY.
Mr. Peile.

The existing lines are :—
(1.) From Bombay North, through Surat, Broach, Baroda, and Ahmedabad, to Deesa, and thence into Sind and through Rajputana into the North-west; (2) from Bombay East, through Thana, Nasick, branch to Dhulia for Khandesh, Bhosawul, and so to Jabulpore and Nagpore; and south-east to Poona, and thence (a) to Sholapur and so to Hyderabad, Madras, and Bangalore, (b) by Satara, Kolhapur, Belgaum, Dharwar, and Hubli, to Bellary, and so to Madras and Bellary, with branches from Belgaum to Vingorla and Goa, and from Dharwar to Carwar and Coompta

in Canara. Communication exists with Ahmednagar by a line between Dhond and Manmar. The principal towns left out by this system of lines are Ratnagiri and Kaladgi or Bijapur. Proposals by the collector of Ratnagiri to construct a telegraph line from Kolhapur to Ratnagiri, Chiplun, and Rajapur are under consideration. A line from Sholapur through Bijapur and Kaladgi to Dharwar is very necessary for rapid communication in a famine. The collector of Kaladgi says—"Telegrams generally arrive with their postal advices, sometimes a day or so later."

MADRAS.

MADRAS
Board of
Revenue.

The Board have not much to say with reference to this question. With the exception of Chittoor, which is within 18 miles of a railway station, telegraphic communication exists between all district head-quarters and the presidency town, as well as along all the lines of railway; and as temporary lines can always be run up when desired, the Board do not consider that the desirability of having rapid communi-

cation in times of distress necessitates the establishment of permanent stations involving a financial loss. At present new stations are always established experimentally wherever there is any reason to believe that they will pay, and continued as a permanency if the result of the trial is satisfactory. If lines of rail are increased, telegraphs must necessarily accompany them.

CHAPTER I.—QUESTION 23.

CHAP. I. QN. 23.

Has there been within the historic period any sensible denudation of the forest in, or bordering on, your province? Can it be tested by statistics showing over how much area forest or scrub jungle has been cut down? Can you state any specific facts which lead you to think that such deforestation has caused injurious effects in any way, either in respect to the fall of rain or the abundance or permanence of water in streams, or wells, or the subsoil, or the denudation of the surface soil, so as to render it unfit for cultivation? And what injury has been produced, and to what extent? Can you adduce any direct evidence that such injury as you think has been caused by the clearing of the forest has been remedied by its reproduction? If you think the clearance has been injurious, what steps would you propose to take towards reboisement? Should it be done by artificial planting, or by conservation of the tract, so as to keep out cattle grazing and fires? Can such conservation be effected without interfering with any vested rights of the people, or with their consent, if interference is necessary? Which of the two methods would be easiest, cheapest, quickest of operation, and most effectual? To what extent, and on how large an area, could either method be followed?

PUNJAB.

PUNJAB.
Major Wace.

The reply to this question is furnished by Mr. Baden Powell, C.S., Conservator of Forests in the Punjab. It is annexed in full. The Financial Commissioner desires me to remark thereon, that, in his opinion, the question whether there has been in the Punjab deforestation of the injurious nature described above must be answered in the negative or left in doubt; except as regards the lower hills of the Hoshiarpur district, where mischief to the adjacent lands below has no doubt occurred from the excessive denudation of the hills, caused by the increased population and manufactures of the district, and by public works on a scale of magnitude previously unknown in that part of the country.

Also, as regards the concluding paragraphs of the conservator's reply, the Financial Commissioner observes that, though in the abstract the Conservator's arguments are correct, the facts, as implied in head 2 of the argument, are likely to give a wrong impression. The conflict is not between vast public interests and the private interests of 10 or 12 cattle owners, but between public interests of a very limited description, which it is proposed to benefit by measures of forest conservancy of doubtful efficacy, and the harrying and discontenting of a whole country-side which those measures involve.

There is only one general remark I have to make on the following answers. The questions set me are very properly directed to ascertain actual facts and results, and not to evoke theories. Forest facts and forest results can only be produced in a series of years; when, therefore, it is remembered that forest conservancy has only been in existence in the Punjab for about 12 years, the actual results can only be few, but it would be the grossest fallacy to allege that we have no sufficient ground to urge the importance of conservancy and reboisement works, because the conditions in which we are placed do not enable us to point to fully successful remedies.

Accomplished evils are only too common; their remedy has as yet only commenced.

We must rely on the known facts of science, on the experience of other countries, on analogy, and on influence from works as yet only beginning to show results. It may be urged that in such a case there is only a probability of success if measures are undertaken; that may be so, but at any rate there is a great deal more than a probability of mischief if they are neglected.

The 23rd question, chapter I., consists, in fact, of a series of questions; and it is only possible to exhibit answers to each paragraph separately:—

(a.) *Has there been within the historic period any sensible denudation of the forest in, or bordering on, your province? Can it be tested by statistics showing over how much area forest or scrub jungle has been cut down?*

In the present state of the country it is not likely that statistics will be available, though, if any useful purpose could be secured by it, with a great deal of labour a sort of estimate of the area of hill ranges more or less denuded might be made.

Q 3387.

The facts (or otherwise) of denudation may be tested in the following ways:—

- (1.) By the tradition of the country and evidence of old people who recollect former state of things.
- (2.) By a study of localities now denuded, and comparing them with similar localities which, from situation or other cause, have escaped denudation.
- (3.) Supplemented as to (2) by the fact that there has been an enormous increase in the demand for wood both for fuel and for construction, which supply is known or certainly inferred to have been drawn from places now denuded.

I have no doubt whatever that throughout the Punjab the denudation of forests has been great and continuous. We have only since 1864 endeavoured to combat it, and that with very imperfect means, and in the face of an opposition which has been and is constant and unrelenting. This is always the case, especially in the beginning of any attempt to conserve, because the great bulk of a population (whether Indian or European) are sensible only to the pressure of immediate wants, and have no idea of individual restraint for the benefit of the whole, or of present restraint for the sake of a continuous supply for the future.

There is ample tradition to show that the outer Himalaya, the Salt Range, the Pubbi Range in Gujrat, the outer hills of the Sivalik,* and many other places were better wooded than they are now.

This tradition is amply confirmed by the fact that these localities bear all the signs of its truth; while we know that practices of burning and indiscriminate

* See remarks at the close of this reply by Mr. Coldstream, Deputy Commissioner of Hoshiarpur.

grazing (practised increasingly with an increasing population) are adequate to produce the disastrous change.

Moreover, the constant wars which before our rule desolated the country cannot have been without effect on the forest. And the immense increase of the population, the demands for railways, for workshops, for cantonments, and for towns that now number thousands instead of tens of inhabitants, and are supplied with fuel and wood from somewhere, must necessarily tend to denude the country, unless measures for reproduction are adopted. These measures have been and are still wholly inadequate to replace the drain on the material.

Within my own time enormous areas in the plains have been cleared of fuel to supply the railways, not the least part of whose demand is for the burning of millions of bricks used in the first construction.

Mr. Coldstream, Deputy Commissioner of Hoshiarpur has proved that the same effect has taken place in the Siwaliks. The destruction (chiefly from similar causes) in the hills, notably in Hazara and Rawalpindi, has been great. The denudation has no doubt been greater in our own time than at any other, because population before was scantier; there were none of the present great centres of demand; and it needs no argument to establish that, the scantier the population and its cattle, the less are the obstacles to the natural reproduction of material taken from the forests.

- (b.) *Can you state any specific facts which lead you to think that such deforestation has caused injurious effects in any way, either in respect to the fall of rain or the abundance or permanence of water in stores or wells or the subsoil, so as to render it unfit for cultivation?*

This subject must be approached apart from the known fact that such evil results are produced by forest denudation both in tropical and temperate climates; but it is impossible to exclude the absolute evidence of facts, the state of the Department des Hautes Alpes, the valley of Devolny, and the region of Embrun, to say nothing of the numerous instances cited in various authors in which the effects of forest denudation are known and recorded. In tropical countries, so far from there being any feature which renders it possible that results would be otherwise, the increased violence and duration of our rainfall can only tend to intensify and make more alarming the results which follow.

Every part of our hill districts where there is any population (i.e., out of the truly Alpine region) is more or less ravaged by torrents. Near Chumba (to take only one instance), and on the route from there up the Siul valley, torrents after torrent may be noticed; dry in the summer, but in the rains coming down with fury, bearing down masses of stones and debris which spread out at last into a vast cone or fan shaped mass of debris; this, increasing in breadth year by year, destroys fields on either side. The same may be observed all over Hazara, valleys that might be fertile and cultivated being filled with stones as far as the eye can reach.

Some of the disasters are, of course, due to landslips and to peculiarities of geological structure, and to accidental closures of the course of a stream, where, after the water has accumulated for a time, the barrier is violently burst, and a destructive flood follows.

But making the fullest allowance for these cases, the number of instances that have come under my own observation certainly due to, or subsequently aggravated by, forest denudation (and even denudation of herbage and turf by burning and over-pasturing—a matter also of the highest importance) are very numerous.

A familiar instance may be quoted in the Tirth valley, or that part of country traversed by the road from Simla to Sultanpur, between say Menglaor and Lārgie.

The state of the "chos" or sand torrents of Hoshiarpur ought not to be entirely unnoticed as another instance. I have specially reported on these curious torrents. The extremely soft nature of the soil of the hills would always render it liable to some detrition, and the streams would always exhibit sandy beds; but their present extent and their constant increase in length and breadth is certainly due to denudation, the evidence of which is conclusive.

The torrents that intersect the Salt Range, and bring down masses of stone and sand, may also be alluded to. The torrents called "Uj," "Rawal," and "Leh," which cross the road between Murree and Rawalpindi, are also mainly if not entirely due to denudation. And I have directed a further more minute inquiry into the "basins of origin," so as to get permission to enclose these as forest lands. The destruction caused by the torrents is only too well known. A recent exploration of the sources of the well-known Chakki torrent near Gujrat showed that the main branches contributing stones and waste material came from hills utterly denuded in Cashmir territory.

The Gaggar is another familiar torrent flowing from denuded hills. There are evidences in Bhawulpur (detailed in the introduction to the Government of India Forest Report, 1872-3) to show that permanent rice cultivation, not derived from the Sutlej, was once there practised; and there is little doubt that the Gaggar was once a steady flowing river carrying fertility far south.

We have of course no statistics to show the area of land rendered unculturable by these streams, whose principal effects are seen to-day in the demand they make on public funds for repairs of roads and bridges, &c.

A great many of them have been so long in action that we can only point to lands now covered with stones without our being able to recall a day when they were otherwise.

As regards that part of the question which relates to rainfall, I would briefly observe that, while experiments carried on in Europe show a probability (and a strong one) that forests may have an influence in actually increasing the rainfall, we are as yet (even in Europe) unable to speak confidently, and in India data are wanting. To suppose that forests can create a monsoon is unreasonable; to suppose that they can attract and help in the condensation of clouds is by no means opposed to a sound judgment. But the practical conclusion is, that while we are waiting for confirmation of the effects of forests in this direction, we are amply justified in taking action regarding forest conservancy and reboisement by the other facts which no one disputes, viz., those concerning the supply of water in streams and wells, the safety of the surface soil on the hills, the prevention of destruction of lands, river banks, and what they support, as well as of bridges and public works, all of which can to some extent be secured by taking care of the slopes from whence the water (which does so much mischief or so much good, as the case may be) first takes its start.

The effect of forests in breaking the force of the fall of rain, absorbing a large proportion of the water, and acting as a filter and as a sponge, both to cleanse and slowly discharge the surplus, are too well known to be remarked on; but in connection with this I should like to say that I believe (with Mr. Medlicott) that the production of "Reh," which we call "Kalar," so deleterious to culturable land, is in no slight measure connected with the interference with the general system of subsoil drainage which must result when the outer hill ranges of a country are denuded, and when the rain that falls abundantly on them every monsoon is not enabled to soak into the soil and to feed permanent springs and streams, but is allowed rapidly to run off the surface carrying stones and sand into various torrent beds which, rushing with great violence for a time (which might be calculated at a few hours out of the whole season), pass away and

leave nothing behind. In a word, the effect is to substitute a surface drainage, violent as well as useless in its action, for a deeper percolation of water, affecting gradually and permanently the subsoil.

I can do no more than allude to the numerous remains of old villages and wells, long deserted and dry, which are found in parts of the Punjab plains. No certain information can be given; while the desiccation may be due to the deprivation of subsoil moisture, there is also the probability that changes in the course of the great rivers, and their recession from the vicinity, may be a more immediate cause. As regards the area rendered unfit for cultivation, the area in Hazara alone of torrents beds amounts to something like 80,000 acres; but the area covered with sand in Hoshiarpur, and otherwise injured all over the country, cannot of course be stated in figures.

- (c.) *Can you adduce any direct evidence that such injury as you think has been caused by the clearing of forests has been remedied by its reproduction?*

In a province where (beyond enacting a few tentative and general rules to save standing trees in certain places) little or nothing had been done previous to 1864, and whereas since then a small forest staff has been employed which had everything to learn, and to make its way slowly against every kind of difficulty both from within and from without, it is not possible that extensive results can as yet be quoted. We have as yet made one large artificial plantation, covering about 12 square miles, and no doubt this has produced locally an increased dewfall and some change in the local temperature. As to the effect of measures of natural conservancy, i.e., giving protection (without artificial planting), all that I can say is, that the natural reproduction (when we have been permitted to protect areas) has been such as conclusively to show the good effects of mere protection. A small but interesting experiment (not under the Forest Administration) may be seen at Rawal Pindi, where a piece of hard clayey soil with a few shrubs or bushes (of about 500 acres in extent) is now a public park full of verdure, and that solely by the effects of careful protection for 15 years. And there are many individual tracts of forest, wherever there have been constituted forests, all over the Punjab, which show the same results. While water in the streams may be found in many of these all the year round, similar watercourses in denuded places will be found dry.

Numerous instances may be met with in the hills of ravines closed up and cured by the spontaneous growth of bushes, &c. where from some accidental circumstance they have had the chance of growing up again.

- (d.) *If you think the clearing has been injurious, what steps would you propose to take towards reboisement? Should it be done by artificial planting or by conservation of the tract.*
* * * * * *Which of the two methods would be easiest, cheapest, quickest of the operation, and most effectual? [I leave the omitted words regarding "vested rights" to a separate answer.]*

The difficulty, of course, is the magnitude of the work. But this should not cause despair. We cannot close the whole extent of vast ranges at once, or supply an enormous forest staff to supervise it. We must do the work gradually. We must attack successively, and slowly, one by one the points where the denudation has produced the worst effects. We must be content to take (in each forest division) a few only of the principal points, and assure ourselves

* Of course roads have now been made, and avenues, trees, planted, but the bulk of the growth of *Acacia Modesta* which covers the slopes is entirely natural growth.

of success. Prejudice may be removed best (as directed in the case of the vast work to be done in the Alps under the French law) by attacking places where the results will be seen at an early date. We should take, for instance, certain parts of the salt range, the sources of one or two definite and destructive torrents in Hoshiarpore, in Rawalpindi, and so forth, and be content to treat these. If we accomplish so much, and leave succeeding generations of officials to carry on the work, we shall have nevertheless done a great work, and saved thousands of rupees.

The first and most essential step is, having selected a definite boundary line along a range of hills selected for operation, or a definite "perimeter," that is, the area from which the ultimate branches and sources of a torrent take their rise, most carefully and completely to close and protect it, so as to give every possible chance to its natural restoration. All experience shows us that this (in a climate like that of India, where growth of vegetation, once allowed a fair chance, is rapid) is the most promising method of proceeding.

Whether we adopt artificial planting or rely on natural growth, this is the first thing (and an absolute sine-qua-non) to be done.

This leads me to the next point; there is no hard and fast rule to be laid down in any case, whether natural or artificial reproduction is to be adopted. The result of natural growth has to be watched. In most cases it will require:—

- (1.) Closing and rest.
- (2.) Certain mechanical aids known as "barrage," or series of rough dams made of rough stone (or what else may be available) built in a series one above the other, to aid the closing up of ravines; as fascines pegged or staked on to the soil; as rows of live stakes driven firmly into the ground, and made of willow, poplar, or other species that strike root readily, so that each stake becomes a tree; cutting of gently sloping gutter or drains to lead off the water, and prevent it concentrating its flow into a dangerous ravine, thus also dispersing moisture, and rendering the hillside soft and damp, so that sowings may be made or cuttings planted along the edges of such drains or channels.
- (3.) Sowing, or filling by transplants, of beds silted up or other suitable places at the heads of streamlets and natural points of drainage collection.

Of course natural production is the cheapest, and, when aided as above, may be just as quick and effectual, if not more so, than purely artificial work; but most ordinarily both will be used in combination, and the precise form to be adopted must entirely depend on the physical conditions of the place dealt with.

- (c.) *Can the conservation be effected without interfering with any vested rights of the people, or with their consent, if necessary? [These words occur in the middle of the last quoted question; but are conveniently separated.]*

As far as consent is concerned, experience can alone show. In the Alps it has been found that when Government commenced the works on areas which it took up compulsorily, as soon as people saw the success attained they began (especially the more rational communal councils, &c.) to do the work in their own neighbourhood themselves and the Government aided in such cases by money grants or grants of seeds and plants. The areas or "perimeters" necessary to be dealt with were declared by forest experts, and the work was carried on by the State or by the "reboisements—Facultatifs" alluded to.

In talking with people in Hoshiarpur I find that those whose lands were affected by the sand were eager that Government should take steps, but the

CHAF. I. QN. 23. people in the hills who had cattle said it was very true that the case was bad, but that their cattle would die. I said, "You can feed your cattle on fodder, and you can take your cattle elsewhere if the worst comes to the worst, but we cannot make the land safe or reproduce grass and wood (which will ultimately, after a little space of self-denial, benefit you) except by closing the hills."

The idea that any peasantry will ever consent at first to anything the benefit of which is future, while the pressure or discomfort is immediate, is contradicted by the experience of all forest countries. By rewards and by compensation you may reconcile people, and that is all. Government must judge what is right and fair to do, irrespective of popular clamour, and their orders must be carried out. The natural love of keeping things quiet, almost at any price, renders officials very unwilling to do this.

But next, as to amount of restraint necessary. The practical difficulty is that, the worse the denudation, the larger is the area over which cattle are spread, searching out the last blades of grass and the last sprouts of shrubs and plants for their scanty subsistence. Generally speaking, however, the locality is of so little use to the people that the actual hardship can be very little if they are deprived of the right to devastate it for a time. Liberality must be shown, and compensation paid where needed; and effort should be made, in all reboisement works, to grow quickly not only trees and shrubs, but above all grass, plants of fodder, and so forth, such as the medicago and other species, which after some months may be cut, of course without up-rooting, as fodder, and given gratis to people that have been excluded. But I beg to call attention to two prominent points the justice of which is undeniable, but which are apt to be overlooked.

1. However much A. and B. may have "vested rights" of grazing, they are not the proprietors of the soil.* Consequently they can never claim to exercise their rights to such an extent as to destroy the servient estate, or render it useless to the proprietor. All rights are inherently limitable to this extent. Hence the soil owner has the natural right to say: "The land is incapable in its present condition (without total destruction) of supporting more than such and such a number of cattle. I require that the cattle admitted should be limited to that number which it will fairly support, and I require that places which are in such a state that they cannot support any cattle at all should be closed, so that my property may be restored, and not rendered alike useless to me and a source of injury to others." Such a principle is admitted by every civilised law, and I could quote ample authorities (if for anything so obvious it were needed) alike from English, French, and German sources.

2. But if there is an absolute conflict between the private and the public interest, the private must give way. It is more reasonable that 10 or 12 cattle owners should be obliged to take their cattle away and grow fodder for them, and feed them in stalls, or even sell them, than that miles and miles of country shall be destroyed by the denudation of the "perimeter" or basin of origin of a hill stream.

The closure, it may be remembered, is only temporary; after a few years (may be under favourable circumstances four or five only, but of course no fixed estimate can be made) partial reopening may be allowed; care has then to be taken not to allow a greater number of cattle on to the site than can really be pastured there without risk of overgrazing for the future.

The existing forest law gives ample powers, in

* Of course, if the dangerous places are really private land, then, unless some special application of the Forest Act can be made, the land has to be expropriated; but here we are dealing with wastes which are in theory Government, as all waste is, but which is burdened with rights.

my opinion, for carrying out the procedure necessary, but nothing can be done without a firm grasp of the principles of forest conservancy, a clear understanding of what is fair and just, and a determination to work on these lines for the public benefit firmly and with a whole heart, not to be moved by a little clamour or an outcry which is sure to be raised if listened to, no matter how intrinsically just and whole-some the restrictions imposed are.

To the above report by the Conservator of Forests, I subjoin the following account of what has occurred in the Siwaliks of the Hoshiarpur district, written by the Deputy Commissioner, Mr. Coldstream:—

There has been within the last two generations a most extensive denudation* of forest area on the outer Siwalik, the chain which runs from north-west to south-east right through the whole district in the direction of its greatest length.

I cannot give complete statistics as to the area of denudation, but have been at some pains to ascertain generally its extent within each hill village.

The result is, that it appears that miles upon miles, I might say tens of miles, of hill side have been cleared more or less completely of their timber and brushwood.

Where formerly the nilgai, the tiger, and even the elephant were found, there is now no forest, not even in some places a scanty brushwood.

This deforestation has had the most disastrous effects,† for I think I may safely attribute to it, if not the existence, at least the increase, of the sandy beds called chohs, which seam the whole breadth of country from the water shed to the south-west boundary of the district. These are very numerous, occurring at almost every mile, and are sometimes themselves $\frac{1}{2}$ a mile broad. These chohs are plains of arid barren land for most of the year; but for a few days each rainy season, and occasionally throughout the year, they are filled with wide rushing torrents sweeping everything before them, and carrying in a few short hours the whole drainage of the lower Siwaliks into the fertile plains of the Doab.

Loss of area in the hill villages from detrition, loss of potential forest income to the villagers, diluvion in the villages in the plains below, destruction of road, bridges, and railways, perpetual waste of sand in the midst of a moist fertile country, growing expenses of sand hills on neighbouring land, formed by the action of the winds, these are some of the evils which the chohs have caused or help to perpetrate, and which are probably intimately connected with the denudation of the forest on the outer Siwaliks.

I have ascertained that in Hoshiarpur parganah above 55 square miles (35,000 acres) are wastes of choh land.

During the period of Settlement 8,000 acres of assessed land alone have been diluviated or deteriorated by the action of chohs. To give an instance of which I know the particulars, the township of Dasuya has lost land worth Rs. 5,000 in two years from this cause.

In Jullundur district the complaints of the Hoshiarpur drainage appear to be yearly increasing, and the floods‡ from these hills have just caused enormous damage in the line of railway.

I believe that the people would generally consent to Government interference. The land is mostly the people's and not Government land; but I think they could easily be persuaded to submit to conservancy in their own interests.

Nature would soon reboise the tract, helped by sowings and plantings, which could be very cheaply done through the agency of the villagers.

* Denudation of hill tracts of outer Siwalik range.

† Disastrous effects of denudation.

‡ Yes. But the floods did not go over the courses of regular rivers, and the damage country and to the railway was owing to the rain acting as a dam from its being deficient in

GORE OUSELY, Financial

I need not further enter into particulars, as the subject has been fully treated in my letters above quoted.

I consider the subject as, one of vital and pressing

Addendum to the preceding Reply.

The Conservator of Forests has written a further reply (which is appended), under the impression that the Financial Commissioner's remarks, with which his previous reply is prefaced, will be understood as asserting that no deforestation has occurred in the Punjab. I am, therefore, directed to point out that the remark objected to was confined to "deforestation of the injurious nature described" in the question, that is to say, deforestation carried to such an extent as to affect the rainfall or water-supply in streams and in the subsoil, or to denude the soil and render it unfit for cultivation.

The letter now received from the Conservator shows, what the Financial Commissioner never denied, that a great deal of timber has been cut

importance, and I am only waiting for establishment for which I have applied, and a general sanction, to commence operations.

down in the forests of the Punjab and of Kashmir. It would have been impossible to build civil stations and cantonments, and to carry on the public works which the Government has undertaken, without a large consumption of wood both for building purposes and for fuel. And the increase of population, and the security obtained under the British rule for life and property, together with the fostering influences produced by limiting the Government land revenue demand, have caused an immense area of waste and forest land to be brought under cultivation. But the Conservator does not, even in his present letter, give figures showing that the deforestation caused by these circumstances has produced the injurious effects described in the question.

I have received a copy of my answer to the 23rd question of the famine questions, chapter I. This answer is, I observe, directly disallowed by the brief remarks which precede it.

2. Were this merely an expression of opinion, I could not, of course, trouble you with any remarks. The answer to questions must necessarily evoke many differences, but my answer is denied in such a form that the Famine Commission must conclude that it need not be read, since it is entirely contradicted by the direction of the highest revenue authority.

3. And the point is one of great importance. For the only conclusion to be drawn is that there is no need for any measures of forest conservancy in the Punjab. But, in fact, I cannot help suspecting that there must be some mistake in the text as it stands. I read with astonishment (if the expression may be pardoned) the statement that, within historic times, no extensive clearing of forest has taken place in the Punjab. It is not, you observe, the question (in the first instance, at least) whether the clearance of forest has been beneficial or necessary, or excusable even, but whether it has occurred as a fact? Now the answer to this can only be that forest has disappeared from one end of the province to the other—not by hundreds but by thousands of acres,—and it would be hardly an exaggeration to say in some parts by hundreds of thousands of acres, and that except in the limited area under conservancy a great deal of what remains is steadily deteriorating.

4. I take the case of the hill ranges only. In Hazara, your own settlement report proves the enormous increase of population and extension of cultivation that has taken place, not merely in the plains but in the hills, where it may safely be estimated that 50 per cent. of the primeval forest has disappeared, while in many considerable hill ranges the whole of the forest has been cut down or reduced to mere scrub. In Rawalpindi, I have not the first settlement report to refer to and give the exact passage, but it is stated there by Col. Cracroft that the cultivation in Murree and Kahuta did not amount to anything more than a small percentage of the whole. At present the demarcation of the remaining forest is so difficult that you will find that you can hardly obtain any continuous or fair-sized block of forest at all. It is a sanguine estimate now to hope that the forest may prove to be 15 per cent. of the whole!

In Kulu and the Kangra hills I need hardly remind you of the wholesale disappearance of forest conse-

quent on the extension of agriculture and the spread of tea cultivation. All around Simla the same is true; the establishment of hill cantonments has everywhere carried with it heavy demands for land for increased potato and cereal crops, and large clearances for fuel and timber supplies, all of which have made great havoc in the forest, and little or no replacement of the forest thus destroyed has taken place. It is only quite of late years that forest conservancy has received attention. In proof of this I beg to call your attention to the Board of Administration letter to the Government of India, 1852, para. 8, &c. (*Barkley's Non-Regulation Law*, page 365).

The same is true in the Salt range as of all the other and lower ranges of the Himalaya.

5. Then also consider the enormous quantity of deodar and pine timber that has been taken to the plains during the last 30 years for civil stations, public offices and buildings, railway bridges, and for sleepers and other objects. All this has been persistently extracted, without method or system and without any sort of control, from the hill forests overhanging our river valleys, the principle of the easiest work being alone looked to. The consequence has been, in Kashmir, that the deodar forests are fast disappearing, no measures of reproduction being taken. In the hills of Chumba and Basahir (like those of Kulu in our own territory) it is only the remnants of forest that were, some 12 years ago, leased by the British Government, and which we have commenced to replant and to conserve.

6. That a portion of this destruction was necessary is not disputed. Cultivation must advance, of course, but it has advanced without due control, and often in a very wrong direction. It is not only to be considered how much land is kept as forest, but how that forest is distributed and where placed.

Nor does this alter the fact that continuous and very extensive clearing of forest has gone on and is still in progress even within our own times.

7. I altogether put aside the indirect evidence afforded by the torrents like the Gaggara, the Hurro, the Sohán, the Bhimbar, Le, Uj, Rawul, &c. The hills from which every one of these or their feeders rise have certainly been denuded within "historic times," but I prefer to rely simply on the plain facts of the great increase of cultivation and the enormous supply of timber to the plains as utterly subversive of the opinion that it is doubtful whether forest has disappeared.

NORTH-WESTERN PROVINCES AND OUDH.

CHAP. I. QN. 23.

NORTH-
WESTERN
PROVINCES
AND OUDH.Captain
Pitcher.

Inquiries are here made:—

- 1st. As to the extent of forest denudation within the historic period.
- 2nd. Statistics of denudation are called for.
- 3rd. Specific facts in proof of injury caused by denudation are asked for.
- 4th. Extent of such injury.
- 5th. Proof, if any, that such injury has been remedied by reboisement.
- 6th. Or if injury still exists, what steps should be taken to repair it?
- 7th. By artificial plantation, or by keeping out fires and grazing and leaving the area to natural reproduction?
- 8th. Could grazing and fires be kept out without trespassing on the rights of the people, or would these latter object to trespass?
- 9th. Which method seems most advisable on financial and practical grounds?
- 10th. And to what extent can recommendations be carried out.

These queries touch on subjects of vast consequence to agriculture. Famine originates in a failure of agricultural operations. This inquiry is being held with a view to minimising that failure in the future; all, therefore, that touches the prosperity and promotion of agriculture is of the first importance.

Throughout question 23 runs an assumption that forest denudation and the conversion of scrub jungle into corn fields produces injury or inconvenience to agricultural interests. It does not appear to the framer conceivable that benefits may have been found to arise to populations from the clearance of forest or jungle. The replies, however, show that some officers think otherwise.

On all hands, from the forest officers of the North-Western Provinces and Oudh to the district officers of Lalitpur, Mainpuri, Etāwah, Moradabad, Muzaffarnagar, Aligarh, Kumaun, Garhwāl, Fyzabad, Gonda, and the Tarāi, extensive denudation, within the historic period, of forest and scrub jungle is admitted, but in no instance can statistics be given.

Nor (save with one or two exceptions) have any specific facts, as distinguished from thoughts, suppositions, and probabilities, been adduced as to any real injury resulting from such denudation.

The exceptions are the opinion of the Assistant Commissioner of Kumaun, that the rainfall of denuded tracts has decreased since such denudation took place, but on turning to his rainfall returns it may be seen that the rainfall of Haldwani, situated in a denuded tract of the Bhābar, actually exceeds in some years that of Naini Tal and Almorah, though these stations are in close proximity to densely wooded hills.

And the Conservator of Forests, Oudh, talks of the southern exposure of the Gondah hills being treeless, and covering the lower country with sand. The southern exposure referred to, when I saw it in 1876, was principally rock. However, as regards these same hills, I have seen plenty of timber in their valleys, and in my separate reply have referred to the excessive and wholesale denudation which is being carried on in those valleys by the Nepaulese.

Where the head of a river or stream is fenced about by forest, there can be little doubt but that the forest should be maintained, so far as it may be found necessary to maintain the stream.

Several district officers state positively that denudation has not been followed by any injurious effect, while those of Garhwāl, Gonda, and Moradabad go further, and point out that denudation has been, from a sanitary point of view, beneficial. From the Tarāi comes a proposition for further denudation, and it is notorious that cultivation in the Tarāi only

CAPTAIN PITCHER.

became possible when the jungle had been cleared to a considerable extent. The Commissioner of Kumaun, the Deputy Commissioner of Gondah, and the Deputy Commissioner of Lalitpur all intimate that they could spare part of their existing forests for cultivation, and the forest officer even of the Eastern Dún goes so far as to recommend further clearance with a view to rendering that part of the country more fit for man's habitation than it is at present.

The Conservator of Oudh admits the profit from a sanitary point of view of deforestation carried on outside of reasonable limits, those limits being the boundaries of his present forests.

The Deputy Commissioner of Kheri admits great evils from excess of forest and jungle, but considers that the benefits of forests outweigh the evils. He does not, however, supply the quantities of the equation.

As, then, denudation would appear to have taken place to a considerable extent without ascertained injury resulting in any instance, while ascertained benefit has resulted in more instances than one, it seems unnecessary to remark further on the remaining paragraphs of the question or to go into the merits of artificial or natural conservation, save to point out that the only district officers who venture opinions are distinctly averse to conservation when carried out at the expense of abrogating those privileges of grazing and rights of way which the dwellers in the neighbourhood of forests, and their forefathers for generations past, have hitherto enjoyed undisturbed. They seem to think that right of way, of common, and of pasturage, which the people of England are able to enforce even in the present day in a forest so little deserving of the name (compared to Indian forests) as that of Epping, should, if a just right, be conceded without demur.

The officer in charge of Tarāi, and the Secretary to the Famine Committee, have, to a certain extent, travelled beyond the record in expressing their opinions that decentralisation of the Forest Department is a measure urgently needed, and that the best interests of the country would be served by trusting local Governments to manage the forests for themselves through the Revenue Department; but if these expressions of opinion will only lead to the suggestion receiving serious consideration, the new departure will not have been taken in vain.

The opinions of the forest officers submitted with reference to question 23 are, as a rule, merely repetitions of the axioms of the Forest Department, and, as the Conservator of Forests, North-west provinces himself remarks that "he fears the information will not be of much value," I may pass them without further remark, save to point out that the rainfall returns of Rānikhet for seven years, given by the Deputy Conservator in proof of the beneficial influence of conservation, exhibit characteristics of rise and fall similar to those of other districts in the North-Western provinces and Oudh for the same years.

The Deputy Commissioner of Jalaun, in replying to the query regarding past famines, states that no famine has been known since 1837-38, and under question 23 he states that there have been no forests in Jalaun "for centuries."

Regardless of cause and effect, he goes on to propose the perpetual alienation by Government of the land revenue on three acres in each estate on which zamindars are to be given takāvi for raising forests. From other figures in the report this would amount to the abnegation by Government of some Rs. 60,000 a year. As the formation of forests is only interesting to the Famine Commission in view to the prevention of famine, a calamity from which

Jalaun is already comparatively free, the proposition can scarcely be supported.

The Deputy Commissioner of Jhānsi rests in doubt as to whether the stony and barren condition of parts of his district (said formerly to grow sugar-cane, but date not given) has been brought about by forest denudation or by the destruction of ancient works for irrigation; on these doubts no opinion can be

Naini Tal.—There have been large clearings in the Kumaun Bhābar; at present about 100,000 acres are cultivated there, the greater part of which was forest 30 years ago. "In the hills very large clearings have been made, and many are going on still, I believe."

(3.) I think it is well known that deforestation must have an injurious effect on the permanence of water in streams and springs. I have no means of knowing whether the actual fall of rain has been affected or not, but it seems probable, as the annual rainfall at Almora, where there is little forest near, is

Bahraich.—*Sub-answer I.*—*The Bahraich forests lie along the Nipal frontier. They have an area of 281 square miles.† Besides them, but not belonging to Government, are the Ikauna jungles, which run in a belt 20 miles long and three miles broad.

This tract has no timber of any value, but it affords capital grazing grounds and fuel supply for the villages around. I am not possessed of information as to "over how much area forest or scrub jungle has been cut down." But it is matter of notoriety that within a comparatively recent period large clearings of scrub jungle have been made. The Conservator of Forests will no doubt have been able to procure some statistics, as this is one of the few subjects in the long list of the Famine Commission questions on which he has to report.

III., IV., V.—I do not think that any deforestation that has yet taken place has caused harm in any way, or has lessened the rainfall in any degree injurious to agriculture in this district. Indeed, what clearings have yet been affected have operated to make the climate of Bahraich more salubrious.

* Taken in part from Settlement Report.

† Bhanthapur forests	-	13 square miles.
Dharmapur forests	-	173 "
Chakia jungles	-	21 "
Charda jungles	-	13 "
Bhonga forests	-	61 "

Oudh.—The sāl forests, usually occupying a high dry light sandy soil, not being so suited for cultivation of cereals as the low and damp forests chiefly occupied by dhāk and miscellaneous soft wood trees, have suffered less than the miscellaneous forests. The sāl forests have suffered more from ill-treatment and from graziers' fires, being more damaged than denuded. In Pilibhīt and Purnapur there were extensive forests of sāl now mostly degenerated into scrub.

The Bhira forests are now simply forests of poles in the Bhūr ilāqua, on the right bank of the Soheli. Cultivation has cleared away a lot of miscellaneous forests, and also near Singhai (Khairagarh) a good deal of miscellaneous forest, huldu and dhāk, has been cleared in the last 15 years. The next clearing is near Motipur, in the Bahraich division, between the sāl forest and Chota Surju; the dhāk trees still remain uncut (for lac), but the miscellaneous forest has been cleared away.

formed. This phenomenon of old sugar mills being found in places where sugar-cane has never been known to grow occurs elsewhere, and is perhaps due to the people setting up mills and expecting from the experience of one favourable year that sugar could be profitably cultivated ever after. It costs as much to move an old mill in some localities as to set up a new one.

only about a third of that of Naini Tal and half of that of Rānikhet. I have repeatedly heard natives of these hills say that where formerly there was enough water to turn a mill there is difficulty now in getting water to drink. I cannot say much regarding the denudation of the surface soil, but with the heavy rainfall usual in these hills I feel sure that denudation must largely take place unless the ground is terraced as soon as the forest is cut down; but I believe such ground is first generally cultivated as "kil," and very gradually terraced.

VII., VIII.—These questions lie at the root of forest administration. There can be no doubt that either the rules of the forest system, or the manner in which they have been worked, or both, have pressed severely upon the villagers, who, under native rule, were allowed, or at any rate managed to enjoy, privileges which are now curtailed; and I am strongly of opinion (and I have an experience of six years and half of service in Tarāi districts) that justice and expediency demand a relaxation of the rules, and more liberal concessions to the villages neighbouring the forests, especially in regard to grazing and the assignment of light timber for hutting. Some of the most cherished traditions of the Forest Department have been recently challenged in a startling manner by Captain Pitcher; and though I can hardly believe with him that periodical fires are not really injurious to forest conservancy, yet there seems much to be said on his side of the question. I incline to the belief that the outlying parts of the forest should be freed from some of the restrictions which now attach to them, but that the inner portions might be enclosed and worked with more strictness than has hitherto existed. The administration of the outlying parts ought to be controlled, if not wholly, at least in a great degree, by the Deputy Commissioner, who should have an additional assistant to aid him in place of the second forest officer, who I learn is to be appointed to this forest division.

I believe that the continuation of the Chukka and Chāndi forests extended far south. In Bahraich and Gonda the forests remain just the same as formerly on the north of the Rapti, but there is no doubt that much forest, even sāl forest, has been brought under the plough south of it. Here the mhowa (for flower and fruit) of the original forest is allowed to remain. The same has been done in Gorakhpur, and is still being carried on; the Government forests will soon be the only forests remaining. Colonel Sleeman mentions large jungles in districts, other than Kheri, Bahraich, and Gonda, the only districts in Oudh that I have forests in, not mentioning a few patches in Hardoi.

With regard to the border, I believe a good many mango groves have been cut for railway fuel along the line of the East India Railway, and that forests also in Mirzapur have been cut down.

I think the only damage has been done in the Bhābar forests, in Tulsipur (Bahraich and Gonda),

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Campbell.Major de
Montmorency.Captain
Wood.

where lopping trees and thorns (for grazing) and overfelling in sal forest has allowed the vegetable mould to be washed away from the service soil. On the hills too, owing to the constant burning (the hills are in Nipal now) on the southern exposure, there is no tree growth to speak of, and the rains rush with violence over the country, covering the country near the nálas with sand.

This injury is confined to the country at the foot of the Bhábar; there is either too little or too much water.

The only thing that I can state is that Mr. Carnegie, who has been in the Bhira forest for many years, last year told me that he had noticed that the Kutna, which before used to be dry for long distances, except at the deep places where there were pools, has now a perennial stream, and the forests on the banks have been protected some five or six years; only partly protected, cutting prevented. I believe the water in the Jowra (Khairagarh) forest is becoming more regular in its flow.

Dehra Dún.—There can be no doubt but that the total prevention of fire would regulate the supply of water to the rivers very much. Now, by the continued burning, the hill sides are hard smooth surfaces, and the water simply rushes off. It does not even penetrate the soil, such as it is. If there were no burning, there would be a mass of roots and moss, which would increase year by year, and would form a soft spongy substance, which would retain the water for a long time. Thus excessive floods on the one hand would be to a certain extent prevented, and, on the other hand, a good supply of water would most certainly be kept up for a long time.

As somewhat bearing on this subject, I may mention what a difference it made in some rivers in Scotland allowing the water to run off freely. The feeding grounds of the river were hills used for sheep grazing, and were much too wet, rank moss and rushes growing in many places instead of heather or grass. This is, of course, very different to the Himalayas, but still the principle is much the same. The hills were intersected by main drains, open ones, cross drains, and drains of all sorts. The result was that, whereas before the drains were cut, when there was heavy rain in the hills, the rivers rose gradually and kept up for some days, and there was first-rate fishing. When the drains were cut, the water rushed down all at once, filled the rivers with filth, and ran down in two days, and there was no fishing. In the same manner, if the rush of water on the Himalayas is impeded by grass and roots and vegetation generally, the water supply of the river will be regulated much better.

But is it possible? In the first place, the tracts of Jaunsár Bawar, or all British territory put together, is but a very very small portion of the gathering ground of the Jumna and Ganges. Would it ever be possible to make the rulers of independent states stop burning? Secondly, how about sheep and cattle? There would be a loud cry of discontent; all the hill men would declare they were ruined, &c., &c. If burning were prevented in our hills and not in independent territory, the residents of our hills would certainly fly to the land not burned. There would be no great loss, but still Government does not of course wish to force them to any such action. For actual grazing, I myself do not think burning is absolutely necessary. It improves the grazing and it brings on the young grass earlier, but I think the sheep, &c. could get on well enough without it. In all the hills where there is heavy snow the old grass is laid, and it takes some time for the young grass to shoot up; but it does shoot up eventually all right, and is really better grass than the grass on the burnt ground. Burnt ground would

The groves of Oudh are, I believe, increasing. What I consider would do good to the provinces of Oudh and the North-western provinces would be increasing the groves and plantations in those parts of the North-Western Provinces, Panjab, and Rajputana that lie to the north-west of the provinces—roughly speaking, the right bank of the Jumna—and also protecting any remains of scrub forest that remain, whether on the hills or plains, as these would act as a tattie; at present a good deal of the moisture from the trees in Oudh is probably carried on in the hot dry season to Bengal;—and the encouragement of tree plantation generally. I would advocate the keeping of as much grass lands as possible in the hands of Government, preventing the breaking of it up for cultivation, as these grass lands yield grazing when the cultivated fields will not yield karbi or bhusa, and it is in famine years that the grass lands have the greatest strain on them.

be ready for grazing fully a month earlier than unburnt ground. This month's delay would of course be great at the worst time of year (in April and May); still I am quite convinced that, by keeping their herds low down, and at that time of year they usually do so, the people would get on well enough. The people themselves, one and all, say they could not possibly, and that all their sheep, &c. would die. I don't think so.

There is, however, one more difficulty; and that is, that insect life increases very much more rapidly in unburnt than in burnt land. The people say that, if the grass were not burnt, their sheep would get so full of vermin they would die. They say the vermin, tick, &c. would fill up their ears and render their life so miserable that they would die. There is something in this, but how much exaggerated I cannot say. Of course, if they could afford to tar their sheep or rub them occasionally with deodar oil, it would keep off all ticks, &c. The Forest Department has heaps of chips, roots, slabs, &c., &c., which would make enough deodar oil for the whole country. If depôts of oil were kept, and the oil given out free of cost or at a very slight cost, the insect difficulty would be got over.

5. The Jaunsáris do graze a great deal in unburnt lands in Jaunsár Bawar. They say they only graze in high-lying unburnt land, and that the cold there keeps down vermin; they say if the low valleys and khads were not burnt, that the sheep could not go into them. I do not think there are any villages that graze entirely on unburnt land.

6. Some people argue that, because burning is necessary in Scotland, therefore it must be necessary here. This is nonsense. Grass land is not burnt in Scotland, except by accident or now and then because the proprietor has a fancy that way. The land that is burnt is heather land. If it were not burnt, young shoots would not be thrown out; all the strength would go into hard useless wood. This is not the case with grass, which grows up afresh from the root each year.

7. The conclusion I come to is—

(a.) That unless you can prevent burning on the great mass of the gathering grounds of the big rivers, there would be very little use doing anything.

(b.) That it is quite possible for sheep and cattle to live and thrive on unburnt lands, so far as food is concerned.

(c.) That I am not in a position to say how far vermin might increase and might harm sheep, &c. in unburnt lands, but I am sure that if deodar oil were given free to grazers no harm would accrue from vermin.

No statistics are available to show the area of forest or scrub jungle which has been cut down. The pressure of the population on the soil has, by gradually extending the margin of cultivation, caused the destruction of nearly all scrub jungle in most parts of Bengal, and it is not generally met with now except in the hilly and thickly populated border tracts of Orissa, Chota Nagpore, and Chittagong. There can be no doubt that in former times a very much larger area was under forest in British territory—as well as in the adjoining Nepal territory than at the present time. From what we know of the latter, clearing of jungle has been carried on steadily of late, partly for extension of cultivation and partly for the export of timber to British territory. In Behar there are unmistakable signs that extensive jungles existed in former times, while, in the present day, only remnants of these are met with along the edge of Behar, as, for instance, on the Kymore hills in the southern part of Shahabad, along the southern boundary of the Gya district, in the Sonthal pergunnahs, and probably also in North Behar along the Nepal frontier. In the Behar plain itself almost all forest and jungle has now disappeared, forest growth having been reduced to mango groves scattered over the country. And even the latter seem to have been indented upon more heavily of late than in former times, owing to the demand for opium and indigo boxes.

The effects of forests on the water-supply are twofold:—

(1.)—They reduce the temperature of a country, and consequently increase the probability of the vapour suspended in the air coming down as rain or fog; and,

(2.)—They regulate the supply of water.

In a denuded country the rain water runs off at once, and collects in the streams within a short time, causing them to rise rapidly, and is carried away to the sea. Land covered with forest, on the other hand, retains a large portion of the rain water at the outset, and gives it up again by degrees, thus causing a steady flow in the rivers instead of a sudden rush of short duration. The effect of forest growth mentioned under the first head tends to increase the rainfall; that mentioned under the second supplies a regular flow of water for irrigation and other purposes, besides preventing deterioration of the soil, consequent on sudden floods. This being the case, denudation, which doubtless has taken place in Behar by slow degrees, must have affected the rainfall and water-supply. The question then arises, what steps should or can be taken to remedy the evil effects? In answering this question great difficulties present themselves. In the first instance, the Government of India cannot prevent deforestation in Nepal; secondly, Behar is for the greater part a densely populated country, in which Government does not possess any lands worth speaking

of. It may, however, be possible to counteract the evil effects to some extent in the following manner:—

(1.)—By causing a fair proportion of the area along the northern and southern edge of Behar to be kept under forest.

In the southern part of the Sasseram district Government has reserved an area of about 30 square miles, but it is believed that it might be possible to increase it to at least 100 square miles. To make up this area the hilly parts of the country, the Kymore range, which are of very little or no value for cultivation, should be selected. Similar steps might, perhaps, be taken along the southern hilly edge of the Gya district.

The northern edge of Behar, along the Nepal frontier, is only sparsely populated, and it would not probably be very difficult to obtain certain blocks for forest purposes, or cause them to be kept for such.

(2.)—The planting of mango and other groves throughout the province should be encouraged, and their destruction discouraged.

Wherever such is practicable the planting of trees should be enforced, and where the Government cannot interfere in this direction the planting might be encouraged by district officers. For this purpose nurseries might be laid out at the head-quarters of district officers and their subordinates, from which seedlings should be distributed. A good deal could be done in this direction if proper energy were brought to bear upon the subject. As regards discouraging the destruction of mango groves the Government may do a good deal. First of all, the use of mango boxes for the packing of opium should be stopped. Considerably over 100,000 cubic feet of timber are now used annually for this purpose at Patna, for which, of course, the finest mango trees are cut down. There will not be any difficulty in obtaining the necessary timber from the Oudh forests until the forests on the Kymore range and in Palamow are capable of yielding the supply.

The Government could further do a great deal of good by preventing local trees being cut down for fuel for brick burning wherever large public works, for instance, railways, are constructed. A good deal of damage may be done in this way. Whenever coal can be produced at a reasonable price engineers should be prevented from using local fuel for the sake of a paltry saving. The great mass of the people of Behar use cowdung to a large extent for their own domestic fires, but when they can obtain a few pice by the sale of firewood they do not hesitate to sacrifice their trees. It would be a grand thing for the welfare of the people if they could, by degrees, however slow, be brought to use manure for the improvement of their fields instead of burning it. One of the great obstacles in this direction is, of course, the scarcity of fuel in many parts of the country, and consequently every tree planted would help towards the object in view.

CENTRAL PROVINCES.

Since 1860 any denudation that may have taken place in some part of the provinces is believed to have been almost counterbalanced by improvement resulting from conservation in others. At any rate, the change in this respect has not been anywhere sufficient to cause any appreciable effect on climatic conditions.

If the forests themselves be appealed to, there is every reason to believe that within the past 150 years the forests of these provinces have much deteriorated, and that the forest cover has been considerably reduced. I refer especially to the portion of the

provinces lying north of the Nagpur extension of the Great Indian Peninsular Railway, and bounded on the east by Rewa state, the Mandla district, and the River Waingaga. Within this area trees are here and there to be found that could scarcely have acquired the form they have, had the conditions of forest growth not once been more favourable. Here and there also remnants of bambú forest are to be found. The presence of bambú in these cases indicates the existence at some time of a richer soil than is now to be found, and the existence of better soil in such

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CENTRAL
PROVINCES.Captain
Doveon.

localities (the slopes of hills) indicates the pre-existence of a better class of forest. That there has been a vast diminution in the area under bambú (in itself a most perfect cover to the soil) I am firmly convinced; and I am inclined to attribute it to the pre-removal of the cover of trees. The bambú impoverishes the surface soil and gives a dense cover during the growing season, and on the trap hills young plants of this species must be so weak as to render the escape from forest fire or even a severe hot season extremely improbable. Thus it would appear that reproduction is chiefly from general seedings when the entire old crop dies off, and if at this time there is no tree-vegetation to shelter the young plants after cessation of the first monsoon there is little chance of any surviving. This opinion is not mere conjecture, but is the result of carefully observing the conditions under which reproduction has taken place on more favourable soils. Considering that the forest tracts of these provinces vary from rich forest to scrub jungle, any statistics regarding areas under wood could furnish no possible idea of the cover on the land, and would therefore, even if available, be useless.

Its Effect.—On this point it can only be stated that the existence of sál round Kiowli in Bijragogarh seems to point to a time when there was a heavier rainfall than at present—while in the Wardha hills there are one or two old village sites, the names of

which I cannot at present recall, the desertion of which is probably due to failure of the water-supply.

The rainfall registered at Kitowli during a comparatively heavy monsoon, that of 1874, was 52 inches; but this is the only record of rainfall at this place. Though I mention these two circumstances, I am by no means prepared to assign the supposed decrease in rainfall or diminution in water-supply to forest denudation, though they may possibly result from it.

Forest conservancy is of too short standing to admit of evidence being produced on this point, but that thoroughly well-stocked and protected forest must gradually tend to improve the water-supply in the vicinity of such forests is a point that does not admit of doubt.

The present rainfall and water-supply in the provinces is good, and for the maintenance of this supply the gradual but steady extension of forest conservation now in progress appears to be all that is required. Government has at its disposal a large forest area within which conservation can be effected without interfering with the rights of individuals. In some cases the acquisition of land for this purpose may be found necessary.

Extraordinary expenditure on restocking artificially does not appear called for except where there is a prospect of such undertakings proving directly remunerative.

BERAR.

Mr.
Ballantyne.

"There are no certain facts within my knowledge as to the decidedly injurious effects of denudation. A register of the rainfall has only been kept for recent years since conservancy has been commenced, that is, since 1866; the data for times anterior are wanting, hence it is impossible to speak with any assurance. Our registers, as far as they have gone, show, however, that the reserved area gets a larger rainfall than the tracts without the forest, e.g., for the current monsoon* the fall at Chikalda (outside our forest reserve) has been 54 inches 19 cents, and within the reserve the fall has been 65 inches 52 cents, taking the average of the registrations at Malka, Pili, and Raipur, points situated at a distance from each other, but all within the reserve. Whether this greater fall is entirely due to the presence of the jungle and conservancy, it would perhaps be rash at the present time positively to assert, but probably conservation has had something to say to it.

* 1st June to 31st August 1878.

BERAR.

"I may also note that within the forest reserved area nullahs that, when I first came, used in the hot season to be waterless, now retain water more or less, here and there throughout the year, pointing to a greater retention by the subsoil of rain-water than was formerly the case. Again, the streams within do not certainly seemingly flood so readily as before, and the discoloration of the water now takes place at a much later date than formerly. These remarks refer to a tract about 400 square miles in the Melghat, —the Bairagarh state reserve—where fires have for eight years been excluded, and where consequently not only has natural reproduction advanced with great rapidity, but the surface soil has annually improved from the accumulation of leaf mould and decayed grass, the roots of the grass and spread of the young trees tending to check denudation of the surface soil, and aiding the retention of water in the subsoil, and those other effects noted above."

BOMBAY.

Mr.
Shuttleworth.

Northern Division.—The northern forest division of this presidency extends from the Kolhápúr and Sávantwari states on the south to Rajputána north. It includes the following districts:—

- | | |
|----------------|-------------------|
| 1. Satara. | 9. The Dangs. |
| 2. Ratnagiri. | 10. Nasick. |
| 3. Colaba. | 11. Surat. |
| 4. Thana. | 12. Broach. |
| 5. Poona. | 13. Kaira. |
| 6. Sholapur. | 14. Panch Mahals. |
| 7. Ahmednagar. | 15. Ahmedabad. |
| 8. Khandesh. | |

And the replies here given are made upon direct personal knowledge of these districts.

1. There has most certainly been within the historic period a very sensible denudation of the forest in most of the above districts.

Not very many years ago the crest of the western ghauts in the Deccan, known as the Ghát Matha,

BOMBAY.

throughout its entire stretch was richly clothed with evergreen forest; "the Dhangs," or groves of primeval trees, still existing in places along the Ghát Matha, testify incontestably to this fact. These dhangs have escaped destruction owing to superstitious fears attaching to them. They were and are still considered by the ignorant peasantry, as well as by the better educated classes of the native population, to be tenanted by spirits to whom the trees are sacred, and the belief exists that if the trees are injured evil will befall, not only the person, but also the connections and property of the person, who commits the injury.

The cross ranges of mountains and hills abutting from the gháts, eastward through the Deccan, were also within the recollection of man mostly covered with forest vegetation, the remains of which are to be seen in the shape of temple, woods, and groves; as, for instance, at the head of a ravine below the cele-

DENUDATION OF FOREST LANDS.

brated temple of Mahadeo, at Shingapur, in the Malsiras taluka of Sholapur, there is a very small primeval wood. At Mandardeo, in the Satara district, on the cross range constituting the watershed between the Krishna and Nira rivers, is a virgin grove occupying a small knoll, while all around is bare and denuded. Many more of these groves could be instanced; their vegetation shows that nature and not man was their creator, and every one of the principal cross ranges in the Deccan could thus produce testimony to prove that their present condition is the result of man's senseless, improvident destruction of the beautiful vegetation with which a far-seeing Providence clothed them for the benefit of the world and all that live therein.

The few existing trees which linger here and there on some of the hills in the far east of the Deccan likewise indicate that in former years, and not so very long ago, natural forests containing the species they belong to covered the hills. On the hill range forming the northern boundary of the Barsi taluka of Sholapur the remains of a mixed forest are to be traced. Blackwood, teak, and its associates are to be found, few in number, distorted and deformed, so as to be almost beyond recognition.

The country round Igatpuri, also in the Nasik collectorate, was a dense impenetrable forest, until the iron horse came and cut a path through the jungle, and consumed the wood to maintain its vitality. The introduction of the railway through the Nasik and Khandesh districts has done much to denude the hills of their natural clothing.

In the Konkan the destruction of forests has been very pronounced: many of the hills in Ratnagiri and Colába have been stripped within the conservator's personal recollection; where a few years ago a dense cover of trees existed, lending beauty to the picturesque, and performing the bountiful offices of nature, now a Sahara of desolation appears.

Guzerat likewise has kept pace with the other parts of Western India in the progress of forest denudation. Possibly the work commenced earlier here than in the Konkan and in parts of the Deccan. But in the Mándvi taluka of Surat, in the Dangs, and in the Panch Máhals, forests and trees have perceptibly vanished.

II. It is very difficult, if not impossible, to test by reliable statistics how much area of forest or scrub jungle has been cut down. But there is indisputable evidence to show that the destruction has not been confined to a limited area, but has progressed far and wide.

III. It is very easy to state specific facts which support the belief that such deforestation has caused injurious effects.

In respect to the

(a) *Rainfall*, its capriciousness in the Deccan, and in parts of the presidency not immediately bordering upon the sea, is undoubtedly due to the destruction of woods and forests; possibly there may be no very marked difference in the total amount of annual rainfall between what it now is and what it was several years ago; there is, however, an appreciable difference which the records of the rain gauge may not do much to enlighten us upon. The presence of trees in the country secures a permanency of humidity in the atmosphere throughout the rains; there is less evaporation during "breaks" in the rains; a stratum of saturated air hovers over the land, and a constant precipitation of moisture, not in heavy downpours, but in frequently recurring light showers, such as are termed "Scotch mists," takes place.

That the destruction of forests has destroyed these conditions, i.e., has injuriously affected the rainfall or precipitation of moisture, is evidenced by the fact that in the Deccan above ghats, the eastern limit of rice cultivation, which can only obtain in the rains, has moved westward; fields that used to grow rice some years ago when the country was better wooded, are in the present day incapable of doing so.

In the Konkan, too, it is acknowledged by many cultivators that the "breaks" in the rains are of longer continuance, and the evaporating power of the sun of greater force, than it used to be when the country was well wooded; and that this operates injuriously upon the out-turn of their rice fields.

In respect to the abundance or permanence of water—

(b) *In Streams.*—We have had many proofs that the destruction of forests upon hill slopes has caused destructive floods. In Khandesh, in 1872, one of these floods occurred in the Panzra and Girna rivers, which have their sources on the western ghats of Pimpalner and Baglan. The inability of the denuded catchment grounds, more especially at the head waters of these rivers, to retain the rain that fell upon them during a few short hours of a dark night caused a sudden flood to come down both these rivers; the bridge over the Girna at Malegaon was swept away; Dhulia was partially submerged; villages on the banks of both rivers were destroyed, human life, cattle, and household property were involved in the destruction that took place. Other rivers in the district, the Tapti, for instance, whose catchment area is better protected, were not similarly affected.

A few days ago a wave of storm water came rolling down the Nira river, and capsized the ferry boat and drowned some of the passengers. Had the hills and slopes, draining into the river, been clothed with vegetation, this volume of water would never have returned to the ocean, and the flood would have been more temperate and of less velocity.

The denudation of hills undoubtedly affects the permanency of water in rivers. There are many rivers in the Konkan, Deccan, and Guzerat which formerly held water all the year round, but now run dry soon after the rains.

On the ghat line, where forest protection has been accomplished, streams of water may be seen all the year round. On the Satara ghats, especially, many examples of this present themselves; where the hill tops and slopes are preserved by vegetation, there clear limpid streams flowing out of the mountain sides occur, and a few hundred yards off, where fire and the axe have destroyed nature's covering, the dry beds of mountain torrents offer a striking contrast.

Numerous instances, too, are to be found of the return of perennial water to the dried-up channels following the re-clothing of the hills with verdure.

The Ratnagiri collectorate is a case in point. Since the hills of that district have been denuded of vegetation the soil has been swept off their surface into the rivers and navigable creeks. Where the ocean tide has opposed the current of the stream there the soil has been deposited, bars and banks have thus been formed, and the depth of water has decreased so as to impede navigation and stop traffic.

(c) *In Wells.*—All over the Deccan, in almost every village wells may be seen that have run dry, not through any silting up or decrease of depth, but owing either to the water contained in the soil having sunk to lower levels, or to the decrease in storage; more of the rain water runs off the ground than it used to when vegetation checked its flow.

There are several instances where water has returned to dried-up wells when the higher levels draining on to the wells have been re-covered with vegetation. In the Poona and Satara ghats wells can be pointed out in which this has occurred. Take the village of Malégaon Budruk in Máwal as an example.

That the deforestation of the country has rendered fields that were once highly cultivated now unarable is not difficult of proof. Constant complaints are made in the Konkan that the unregulated flow of water off denuded hills washes away the embankments of rice fields, sweeps crops away, smothering them under soil brought off the hills, scores the fields with gullies and watercourses, carries its soil

localities
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vast, and converts it into a barren waste. Cultivators most numerous petition every year for the remission of their assessment on this account.

In the Deccan, too, survey numbers may be seen in many of the villages, especially near hills, which a few years ago were productive fields, now deprived of their soil, scored all over with deep channels for short-lived floods to race down, are waste, uncultivated, paying no rent to Government, and doing nothing towards the support of man.

The destruction of trees on flat lands, too, has rendered fertile fields unarable; the absence of dew and of subsoil enrichment, added to increased evaporation, no leafy protection interposing between the direct rays of the sun and the surface soil, has completely exhausted the land; huge cracks and fissures are to be seen all over the fields, and the absence of the chemical constituents of fertility prevent it from bringing forth its due increase; the fields, having thus become utterly impoverished, can no longer be cultivated with profit.

When the plains of the Deccan and Kandesb grew trees, then the fields were necessarily more fertile than they are now. The trees furnished the materials for the formation of that vegetable mould from which crops derive their nourishment; everything that fell off the trees became natural manure; by their roots the trees not only opened the pores of the soil, but drew up moisture from the bowels of the earth, which they distilled through their leaves, to water crops, to cool the air and to benefit cultivation. They shaded the ground at certain times of the day from the evaporating power of the sun.

There are numberless proofs in the northern districts of the destruction of reservoirs and the injury to cultivation following the eradication of trees.

In the Poona collectorate there are two large reservoirs, one at Warkhi, some 12 miles south, the other at Pátas, 35 miles east of the city of Poona, built of masonry and well constructed. These reservoirs once stored large quantities of water, and now one is completely silted up, and the other is fast arriving at the same condition, and a forest growth has usurped the place of water. The cause of this is not difficult to discover; denudation of the catchment ground has sent avalanches of soil to fill up the excavated beds of the reservoirs. At Koregaon, in the Bârsi taluka of Sholapur, the same thing is to be seen. A large lake, constructed at great expense, is no longer what it was intended to be—the soil of the overhanging hills has in a great measure silted it up, and babul trees have encroached upon its territory, while its dam has been thrown down by the headstrong rush of water into the basin, which silt had rendered incapable of holding what it was intended to when constructed.

In all directions in the northern districts, far and wide, blandhâras or dams across streams are to be seen inoperative—they have either been tumbled down and swept away by uncontrolled torrents, or the storage area behind them has been filled up by silt.

Along the foot of the Sâtpurâs, in the Tâpti valley of Khandesh, a large tract of deserted country is to be seen at the present day. Numerous broken bandhâras testify that the denudation of vegetation on the upper lands was complete at a certain period of their history, and it is reasonable to conclude that the hundreds of masonry wells existing in the locality ran dry at the time that these dams were swept away, and that the result of this denudation, and of the deprivation of water storage for irrigation, was one of the causes of the exodus of population that took place. Wars and strife, too, had something to do with it. Now the country is covered with vegetation, and the wells hold water, but the cultivator has not yet returned.

In connection with the Nasik districts it has been reported by local officers that increased cultivation of sugar-cane has resulted from the protection of forests; that fields adjoining the forests, which could

not be profitably cultivated a few years ago, now produce good crops of cane, and that whereas this cultivation now obtains in the villages where forest reserves have of recent years been formed and protected, it has not yet returned to the villages in which there are no forests.

IV. What steps should be taken towards reboisement, &c., &c.?

In the first place, I think that as much as possible of the hilly land, and of the undulating broken ground in the country, at present denuded, should at once be brought under protection.

The lowest stratum of air contains the greatest quantity of aqueous vapour, and hence it might be expected, *ceteris paribus*, that more rain would fall on low-level plains than in elevated countries. The contrary, however, is the fact. The increase of rain is gradual as we ascend. This may be accounted for satisfactorily by the colder air on elevated places, and by the clouds resting on the summits of mountains without descending into the plains.

If mountains be protected from solar radiation by forests, and if the transpiration from an enormous leaf surface has the same cooling effect as terrestrial radiation, it stands to reason that the effect of elevation is still further augmented; the fall of rain is heavier.

Forests should likewise be formed in the plains and more level grounds, where trees afford important assistance to agriculture by promoting natural irrigation, by preventing undue evaporation and exhaustion of soil, by providing manures, &c.

Trees extending along the sea-coast, by interlacing their roots with the land and alluvial soil, help to render it more compact; they also assist in arresting the mud deposited by rivers, and in forming the so-called deltas at the estuaries of the latter.

Forests planted on the banks of rivers have the effect of binding the soil and preventing erosion, and of confining the stream to its proper channel.

The absence of wood for domestic purposes in the Deccan, more especially, requires the formation of forest in the plain countries of Satara, Poona, Sholapur, Ahmednagar, Nasik, and Kandesb, where the bad effects of the scarcity of wood upon the domestic, public, and social concerns of the people are visible; the excrement of cattle is used extensively to cook food, and the fields are thus deprived of a valuable manure.

V. The *modus operandi* of reboisement.

The more expensive system of artificial planting by means of nurseries and transplanting should be undertaken in connection with favourable localities, where soil is deep and suitable and water at command. Casuarina plantations on the sea-coast should thus be formed.

Plantations of babul, bor, nimb, &c. on black soil in the Deccan, on banks of rivers, &c., should be made by ploughing the ground and sowing the seed in the furrows.

But the area of denuded hills, of lands possessing poor soil, is so very extended that a much less expensive *modus operandi* must be adopted in connection with these localities. Seed must be collected in the neighbourhood in large quantities and be brought from distant forests, to be thrown profusely by hand, at the commencement of the rains, over the denuded lands, which must be protected most strictly against cattle grazing, against cutting, and against fire. Conservancy is the keystone of success in the reboisement of denuded lands, and this conservancy must be real and not nominal. Guards must be appointed to watch, and the law, by deterrent punishments to destroyers and trespassers, must support the guards.

VI. Can planting and conservation be effected without interfering with the vested rights of the people, &c.?

No vested rights of the people will suffer. As a rule in the Deccan the people have as a part of their

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holdings in the hilly part of the country pôt kharâb land, *i.e.*, unarable, upon which no assessment is charged, and therefore grazing lands have been provided them in their own holdings.

If rights of the people do come into collision with the planting and conservancy arrangements, then, in the interests of the country and public, the exercise of the rights must be suspended for a time; in a few years, when the vegetation has made pace, the exercise of these rights may again be permitted, and will then be more valuable than before.

VII. Which method of reboisement would be the easiest, cheapest, &c.?

The system of broadcast sowing of seed, with closure against man, cattle, and fire, is undoubtedly the easiest, the cheapest, the quickest of operation, and most effectual where such a very large extent of

denuded country presents itself as is the northern districts.

VIII. What extent, and on how large an area, could either method be followed?

The physical configuration of a country and local circumstances must determine the portion of it to be under forest protection; as a general rule, 25 per cent. of every district should be under forest or tree growth.

N.B.—One final suggestion remains to be made in addition to the foregoing, *viz.*, it should be provided as a compulsory measure, that the strip of waste, unassessed land belonging to Government, dividing fields, and forming the boundaries of the latter, should be planted with trees by the holders of adjoining fields, who should protect the trees, and while being prevented from cutting them should have the legitimate usufruct of the trees.

Southern Division.—There has been denudation outside the province, and along the western ghats in Goa and Sâwantwâri territories bordering on Kanara and Belgaum. From considerably below Unshi to the Amboli ghat the forests have been almost entirely destroyed by kumri cultivation; also, many of the hills show the loss more or less of their surface soil, and have become barren of all but the most scanty vegetation. Within the province, in Kanara, along the ghats, this evil was checked something over 20 years ago, and has since been kept well in hand, but on its north-eastern frontier much forest or tree-clad lands have fallen to the axe of the cultivators in their advance, not, however, to any appreciable extent, and only to satisfy their fair and legitimate wants in fresh lands to cultivate. In the Bidi taluka of Belgaum denudation has been greater, and in the Belgaum taluka more again; in the latter, in particular, the hill sides have been seriously encroached upon, and broken up for cultivation more than was right. Around Belgaum, too, the hills have been much denuded, but those that roll east and occupy lines through the centre and southern portion of the Kaladgi districts, having more or less the Ghratprabhâ and Malprabhâ Rivers running through them, have suffered serious denudation. In Dharwar, along the southern border touching Mysore, the double range forming the Mâsur valley has been seriously

denuded, and so also the rather lofty Kapat range south-east of Dharwar. Both ranges touch almost the Toongbhudra River.

The Goa and Sâwantwâri tracts, denuded by kumri cultivation, may be roughly put down at between 700 and 800 square miles, and the other areas may be ascertained with some exactness from the records of the Southern Maratha Survey.

Of the effect of denudation on the actual rainfall I cannot speak, but my feelings and senses incline me to think the fall of rain is sensibly affected by the denudation of forests, but of the other injurious effects there cannot be doubt. It has often appeared to me in the direction where the deforestation has been indicated, in Dharwar and Kaladgi especially, that year by year the sudden rushes of water from the hills are destroying the culturable lands immediately below them, causing serious erosions and siltings. Many parts, in my opinion, of the lands along the base of those hills are fast being made arid from receiving rushes of water charged with kunkur (gravel) and mere sand, instead of the more equal distribution caused by the roots and stems of trees and shrubs, carrying with it the thick leaf-mould deposits of the deciduous trees and shrubs that once covered the hills, but which improvidence and waste have destroyed to a very sensible extent indeed.

the rainy season, from the denuded hills and mountains, but which should be, perennial in their flow, that nature seeks to maintain a permanent supply of water in the important rivers flowing eastward to the sea. The Ranzani stream is one of the first links in the water-supply of the Bhima, and having its rise in a mountain now well clothed with large vegetation, it is perennial in its surface flow.

Again, Torno is a village in the Khed taluka about three miles from the crest of the western ghats, and is situate at the base of the mountain which divides the Andra and Bhama valleys. The forests here were demarcated in 1870-71, and have greatly increased. At the time of demarcation, and for about four years after, the water in the only well (three feet broad) of the village dried during the month of February or March of each year. The people then procured water from Tambrachi Waddi, a distance of three miles from Torno. The excavated but unbuilt well is situate at the base of the now well-wooded mountain on the bank of a nullah, a tributary of the Bowli river, which is a tributary of the Bhama, which is an affluent of the Bhima. There were last May nine feet of pure mountain-spring water in the well, which has now been made by the people themselves 15 feet broad. The water has risen to within five feet of the surface. The people here most freely acknowledge that this new supply of water is due to the increased vegetable growth on the mountain, and I am perfectly certain of it.

Poona.—Regarding the subject of “inquiries remedied by reproduction of forests,” I would cite one or two instances. The village of Malegaon Budruk, in the Mawal talooka, is situate on the crest of the western ghats. The valuable mountain forests of this village, 2,430 acres in extent, were demarcated seven years ago and are vastly improved. Grass is plentiful and the water-supply in the stream near the village has greatly increased, so much so indeed that a well built five years ago, with the help of local funds, at a cost of Rupees 250, is now made scarcely any use of by the people. In the words of the patel and kulkarni of the village, “You have here now, in the low-lying lands, only to dig a few feet deep for water and you get it.” In a re-entering angle of the high mountain reserved for forest to the east and north of the village, and about 400 feet above the village level, is situated the rise of the Ranzani stream, an important tributary of the Andra river, which is a tributary of the Indrayeni, which is again an affluent of the Bhima. To my certain knowledge, no water remained in the high sloping bed of this stream six years ago after the month of February of each year. There was during May last to be found there flowing pure clear mountain-spring water. The people inform me that year by year the water is increasing in volume, and this fact and this subject generally have from my point of view a very deep importance. It is by the help of the countless numbers of little streams which now flow, most of them only during