

A TOUR IN THE TRICHINOPOLY DISTRICT.

From C. BENSON, Esq., M.B.A.C., Assistant Superintendent, Government Farms,
to W. R. ROBERTSON, Esq., M.B.A.C., Superintendent, Government Farms,
Madras Presidency.

SIR,—I have the honor to submit the following notes and observations on the agriculture of Trichinopoly, from a tour in which district I have recently returned.

2. In December 1878, I received orders to proceed to Trichinopoly to perform a tour in that district with a view to my obtaining a practical knowledge of the varying modes of cultivation and crops on the soils prevalent, in fact to perform an agricultural survey of the district.

3. I reached Trichinopoly on December 16th and left, after seeing the villages situated close to the town, on the 20th for the southern portion of the district, visiting Kolatur and Mannalparai; from the latter place I went by Kovilpatti to Marangapuri, a Zemindari in the extreme south, returning to Mannalparai *via* Puttanuttam. Leaving Mannalparai for the north I visited Togamalai and Sevayam *en route* for Kulitalai, which I reached on January 4th, from thence I proceeded up the river (Cauvery) bank as far as Manavassi, not far from the Coimbatore boundary, and thence returned to Trichinopoly, at the request of the Collector, in order that I might afford the Famine Commission what information I could regarding the district, but owing to sudden changes in their arrangements I did not reach Trichinopoly in time to meet that body. From Trichinopoly I proceeded east to Tiruvarambur, and thence north across the Cauvery and Coleroon to Lalgudi, whence, after halting a few days, I proceeded *via* Pullambadi, Trimulavadi, Periamurray, Vuppur, and Madanuttur to Jeyankondasholapuram, halting at each place named. From the last named place I travelled to Gungaikondapuram and the lower anicut, returning to Jeyankondasholapuram, after which I again left westwards for Aryalur, halting *en route* at Telur. From Aryalur I proceeded to Perambalur halting on the road at Kunnam. Making Perambalur a temporary centre for a few days, I visited Arambavur (16 miles), a village near the Salem border, and also proceeded as far north as Rajanguddy (10 miles) a few miles from the Vellar. Thence I proceeded southwards *via* Kurumbalur into the Musiri Taluk halting first at Settikulam and then at Toriur. From the last named place I proceeded to Musiri, halting at Kannanur and Valavandi; and from Musiri I returned along the north bank of the Cauvery and Coleroon to Trichinopoly, and thence by rail to Madras, which I reached on March 10th, having been absent nearly three months.

4. During my tour I travelled the following distances :—

In	Movements of Camp.	Visits to Villages.	Railway Journeys.
	MILES.	MILES.	MILES.
December	60	28	245
January	122	58	...
February	140	72	...
March	43	12	245
Total Miles ...	366	170	490

making a grand total of 1,026 miles in the whole tour; but to this should be added a considerable distance travelled over in going round the lands of the various

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villages in company with the cultivators. In order to enable myself to do justice to the duty on which I was deputed I was compelled, from the restrictions which the rules laid down for the allowance of my travelling expenses would have put upon my movements, to undergo considerable personal expense. Had I not done so I should have been obliged to move only at night, and should have possessed but little of that power of free movement, which the duty requires for visiting different villages. As it was I travelled solely by day, and on horseback, so that I was enabled to see the whole of the country through which I passed.

5. My usual manner of conducting enquiry was to visit a village, either specially, or on the road from one camp to another, and with the ryots, who had been assembled beforehand, to walk slowly round the lands of the village asking questions so as to induce the cultivators to describe their customs in detail, asking explanations where I could not appreciate the force of certain practices, and generally receiving as a reply, "Its custom!" Working in the manner described I saw a large area of country in the course of my walks. I often moved my camp in the morning, visiting some village on the road, and also in the afternoon the village at which I was camped, and during the second day at a camp visited some other villages within a few miles distance of it. By this means I was able to obtain a good idea of the systems in different localities.

6. I would observe however that the time allowed for my tour was in some respects too short for so large an area as that of a district. It would be far better, and would enable an officer to give far more detailed information regarding a district if he were able to pay two visits to it instead of a single one. If he were able to do so he would be able to investigate in his second tour many points which perhaps he did not fully appreciate in his first. The interval between the two visits would enable him to form his general ideas into shape, and his second visit would confirm or reverse any points which were doubtful. Working in such a manner, a method which was pursued regarding the Nilgiri District, much more reliable information would be collected and preserved.

7. At the time of my tour the country was all very dry, the north-east monsoon rains having failed; and the standing crops, which were few, had suffered severely from the effects of that deficiency. Very little work was going on, excepting harvesting and threshing, so that I was unable to test by observation the statements of the ryots regarding their operations, such as the usual depth of ploughing, the expenses of, and care bestowed in, weeding, &c. Consequently I had to rest satisfied often with the statements made to me, which were almost always, I believe, much exaggerated. The ryot tells you what he ought to do when you ask him what he does, not what he actually does do, and his practices and precepts present as great a divergence as possible in most cases.

AREA, POPULATION, HOLDINGS, &c.

8. The total area of the district is 3,515 square miles of which 599 square miles are occupied by forests, waste lands, and permanently assessed properties; the area of Government land is therefore 1,866,240 acres. The following statement shows the area occupied and the area left waste at the dates mentioned:—

Fasli.*	Irrigated.		Unirrigated.	
	Land occupied.	Land left waste.	Land occupied.	Land left waste.
	ACRES.	ACRES.	ACRES.	ACRES.
1271	148,998	17,044	522,857	560,852
1276	126,023	5,940	761,781	335,203
1281	135,275	3,582	857,760	291,219
1286	136,137	3,329	829,062	321,824

* The fasli year being the crop year, and the year by which all statistics are made up, I have adhered to it. Fasli 1286 commenced in July 1876 A.D.

From this it will be seen that there is still a very large area of land not paying any rent to Government, the use of which, for the purposes of pasture, the ryots have free of any charge. The proportion of rent-paying to non-paying land in 1271 was as 100 : 86; in 1286 it was as 100 : 84.

9. At the census in 1871 the population of the district was returned as 1,200,408, or 341.5 per square mile. In the twenty years ending 1871 the population had increased by 261,008, or about 25 per cent. The average number of inmates to a house was 5.8, varying from 3.9 in the Kulitalai to 8.2 in the Udiarpolliem Taluk. About 93 per cent. of the people were Hindus, 2½ per cent. Mahomedans, and the rest (4½ per cent.) Christians. Of the male population, 380,259, the number engaged in different manners was as follows:—

	Number.	Percentage.
Professional ...	16,774	4.41
Domestic service ...	13,572	3.57
Commercial ...	17,165	4.52
Industrial ...	37,794	9.95
Agricultural ...	219,271	57.64
Indefinite ...	75,683	19.91

whilst of the last class 70,587 were registered as laborers, so that about 93.38 per cent. of the whole male population are directly dependent on the soil for their support. The population, considered with reference to the people, is not a heavy one for a country to bear, even if less favorably situated than a portion of the district is under the irrigation of the Cauvery river. Probably the population does not demand from the soil more than that of France, and certainly not more than that of Italy for its support. A very large proportion of the total number of people reside in the Cauvery valley, where the population is nearly 600 per square mile.

10. It may not be uninteresting here to determine the food-product of the district, this, if we adopt the figures collected in making the settlement, is not difficult. The following table is taken from the settlement report of the district. It shows the average produce per acre of each description of cereal crop on the different classes of unirrigated lands:—

Class of Soil.	Cholum.	Cumboo.	Raggy.	Varagoo.	Average of all.
	LB.	LB.	LB.	LB.	LB.
1st ...	1,200	1,200	1,440	...	1,260
2nd ...	1,080	1,200	1,320	...	1,200
3rd ...	960	1,200	1,200	...	1,120
4th ...	780	...	1,020	1,344	1,048
5th ...	780	960	1,020	1,344	1,026
6th ...	720	900	720	1,084	856
7th ...	600	720	720	864	726
8th ...	480	600	600	720	600
9th ...	420	600	600	720	585
10th ...	...	Not given.	...	...	450*

Next we must consider the proportion in which the different classes of soil exist, and then by multiplying the area in each class by the average produce of that class the total possible product, supposing that the cereal crop were grown alone will be arrived at. At the time of the settlement this calculation gave a yield of 759 lb. per acre; but from this must be deducted one-fourth to allow for bad seasons, which brings the average yield down to 570 lb. per acre, a very little over 5 cwts. The average rent of the land which gave this rate of produce was 15 annas 5 pies per acre. At present

Low rate of produce.

* This is estimated by me by reference to the preceding figures.

the average rent in the district for irrigated land is only 14 annas 11 pies, so that the probable yield is at present certainly not likely to be above 5 cwts. Turning to the settlement report the yield of paddy was said to vary from 612 lb. per acre for 9th class land to 1,305 lb. for 1st class; and following the same

process in calculating as I have as regards the unirrigated lands, the average yield of first crop per acre for all paddy lands is found to be 1,536 lb. From this a deduction of one-sixth has to be made for bad seasons lessening the yield to 1,280 lb., or a little over 11 cwts. or 25 bushels. (Considering that out of 136,000 acres of irrigated lands in the district about 80,000 are irrigated from the Cauvery and Coleroon channels, this average is not high. If we may judge by the fall of the assessment the outturn is less now than when the settlement was made. The second crop is according to settlement estimates half that of the first, but according to the evidence of the ryots about three-fourths.

11. In the following table I give the areas which have been occupied with different crops during each of the last six years, and the average of the whole period:—

Cereals.										Industrial and Special Crops.										Grand. Total.																																							
Irrigated Paddy.					Unirrigated Crops.					Pulses.					Garden Crops.						Coriander Seed.					Oil Seeds.					Fibres.					Dyes.					Sugarcane.					Tobacco.													
Area.					Percentage of Total.					Area.					Percentage of Total.						Area.					Percentage of Total.					Area.					Percentage of Total.					Area.					Percentage of Total.					Area.					Percentage of Total.			
Fiscal.	ACRES.	177	16.73	671	63.42	85	8.03	17	1.61	20	1.89	30	2.84	50	4.73	3	.28	3	.28	2	.19	1,058																																					
	179	17.81	638	63.48	82	8.15	18	1.79	13	1.29	23	2.29	45	4.48	3	.29	8	.29	1	.1	1,005																																						
	185	18.74	663	67.18	62	6.28	17	1.72	14	1.42	25	2.52	14	1.42	2	.20	3	.30	2	.20	987																																						
	181	18.1	633	63.3	72	7.2	19	1.9	14	1.4	26	2.6	49	4.9	2	.2	2	.2	2	.2	1,000																																						
	182	18.49	610	61.99	80	8.13	18	1.83	23	2.34	26	2.64	40	4.06	2	.20	2	.20	1	.10	984																																						
	161	17.24	601	64.35	71	7.60	15	1.61	23	2.46	24	2.46	35	3.75	1	.11	2	.21	1	.11	984																																						
	Average of 6 years.	177.5	17.9	636	65	75	7.5	17	1.7	18	1.8	26	2.6	39	3.9	2	.2	2.5	.25	1.5	.15	994																																					

In this statement 000 are omitted in the areas; fractions of 1,000 are omitted; where they exceed 500 the sum is raised to the next highest figure, and where less than 500 omitted.

It will be seen that cereals, or white crops, occupy nearly 83 per cent. of the cultivated area; in this however the area of second crop paddy is included. Pulses, or black crops, occupy 7.5 per cent., and garden-crops less than 2. Chillies which occupy nearly half of the area under the latter ought scarcely to be included with garden-crops, as these are chiefly grown on unirrigated lands, and not in gardens. The oil-seeds grown are chiefly castor and gingelly, the fibre almost solely cotton; the dyes are indigo, and turmeric, and a few others on a small scale.

12. Although as I say the chief oil-seed grown is castor, in the returns from which the above figures are taken not an acre is entered as under this crop, all the oil-seeds being clubbed together, although a separate heading is devoted to castor.

From my impressions in travelling I should have said that much more than 2 per cent. of the country carried a castor crop during my tour, and the same regarding the area under cotton. Probably the fact is that, owing to the practice of sowing these products mixed together, and with cereals, the actual area under them is not returned, but that portion of the area which they are supposed to occupy; thus if three crops are sown together in a field probably one-third of its area is entered as being under each crop, which is very misleading.

13. In the following table I have brought together the statistics which show the state and number of the tenancies of Government land :—

Faali.	Total Occupation.		Government Tenants.		Average size of Holdings.		Sub-tenants.		
	Acres.	Ratio of dif. ferent years.	Number.	Ratio of dif. ferent years.	Acres.	Ratio of dif. ferent years.	Number.	Ratio of dif. ferent years.	Number of Sub-tenants per 100 Tenants.
1271	671,850	76	85,808	85	7.65	87	20,279	77	23
1276	887,804	100	100,533	100	8.83	100	25,829	100	26
1281	993,135	112	117,536	117	8.41	96	21,696	84	18
1286	965,189	109	142,225	141	5.39	61	52,992	205	37

From this it will be seen that notwithstanding the enormous areas taken up by the ryots, and others, as soon as the new settlement was introduced in 1274, the process of sub-dividing tenancies has gone on; there having been an increase of 41 per cent. in the number of lease-holders in the ten years following 1276, with a corresponding decrease in the size of the tenancies. At the same time the number of sub-tenants has more than doubled, there being in 1286, 37 sub-tenants for every 100 lease-holders, whilst ten years earlier there were only 26. I look upon the figures given for 1281 as being open to considerable doubt, as it is difficult to understand such sudden fluctuations in the number of sub-tenants as they would show.

14. The total number of leases in 1286 was 137,478, and I give in the following table the numbers paying certain amounts, at the respective times referred to :—

During the year Faali.	Lease-holders paying										Total Number of Leases.
	Under Rs. 10.		From Rs. 10—30.		From Rs. 30—100.		From Rs. 100—500.		Above Rs. 500.		
	Number.	Percentage of Total.	Number.	Percentage of Total.	Number.	Percentage of Total.	Number.	Percentage of Total.	Number.	Percentage of Total.	
1271	71,597	67.5	22,887	22.5	8,591	8.1	1,853	1.7	159	.2	106,087
1276	95,541	75.6	22,050	17.4	6,985	5.6	1,673	1.3	113	.1	126,362
1281	104,800	75.2	24,612	17.7	8,323	6	1,374	1	123	.1	139,232
1286	103,903	75.1	24,867	18.7	7,112	5.1	1,475	1	121	.1	137,478

From these figures it will be seen that there are now nearly one-third more leases than 15 years ago, and that the proportion of large tenancies has considerably decreased; the chief increase in the number of lease-holders having taken place in those paying under Rupees 10. This has been due to the lowering of the rent which took place after the new settlement was made, when every one, had he means of cultivating the land he took up properly or no, applied for waste lands, which were offered at such temptingly low rates. Only an insignificant proportion (6.2 per cent.) of the leaseholders pay a rent of more than Rupees 30 per annum, so that almost the whole cultivation is in the hands of paupers.

DESCRIPTION OF THE COUNTRY, SOILS, &c.

15. The district is locally divided into an irrigated "Nirambam" and an unirrigated "Kadarambam" division. The former consists of the valley of the Cauvery which is occupied almost solely by paddy; interspersed however amongst the paddy-fields are numerous cocoanut plantations, situated on slightly elevated patches, which give the country an appearance of being well wooded, and which afford a striking contrast to a traveller coming down from the highlands on either side of the river. The Cauvery divides the district into two unequal portions, the smaller and poorer lying to the south of the river; in this part of the country for many miles a wide open plain of poor land extends which is, especially near the river, very bare of trees, in many places being nearly treeless. Farther south, at the extreme end of the district in this direction, numerous small hills exist which are for the most part covered more or less sparsely with scrub-jungle, and there the country to the eye appears at first sight to be well wooded, but further investigation shows the trees to be small, and not occupying any large proportion of the total area. Along the road-sides many fine trees are growing, chiefly tamarinds and figs: the former tree is very remunerative as they let for a very good annual rental. This portion of the district suffers much from fever, and whilst I was in it a very large proportion of the population were down with it. Several of my servants were attacked by it.

16. North of the Cauvery in the east of the district the greater part of the country is, excepting the most extreme portion of 2 or 3 miles, for 15 to 20 miles covered chiefly by a low scrub about 5 or 6 feet in height. In this locality it is customary to clear the scrub, and after two or three years' cropping to relinquish the land. Large areas of scrub are also annually being cleared to supply fire-wood for the Tanjore District, the large town of Combaconum consuming an enormous quantity. Farther westwards after the light soils of the eastern portion of the district are left behind, the country on the black cotton soil is extremely bare, although everywhere signs are to be seen, in magnificent tamarind and other trees, of what might be done by a little care and labor in raising a valuable property of fuel and fruit trees. This bare country occupies nearly the whole of the Perambalur Taluk, for excepting on the Putchamullays, which form its southern boundary in the west, very little wood exists. In the northern part of the Musiri Taluk there are a fair number of trees, but still the country is very badly wooded; in the southern portion bordering on the Cauvery an almost perfectly treeless plain exists, the roadside avenues being the most conspicuous mark on the landscape.

The only hills included in the Trichinopoly District are the Putchamullays, the highest portion of them being less than 3,000 feet.

"The aspect of the low country of Trichinopoly on the gneiss, as on the cretaceous rocks, is gently undulating and bare of vegetation, and except in the occasional occurrence of small bosses and low hills, such as I have described, the former differs but little from the latter. The vegetation depends more on the nature of the soil than on that of the underlying rock, and except a narrow strip at the foot of the hills, both gneiss and the cretaceous rocks are covered for the most part with black regur, which, from the water-shed of the Cauvery northwards to the Vellaur, covers the country so thickly that but little of the underlying rock is anywhere

exposed. In the drainage basin of the Cauvery the denudation has been greater, the average level of that river being much below that of the Vellur, and the fall of the country which it drains on either side in consequence more rapid."

17. According to the return of the year 1286 the total area under plantations was 8,000 acres, or less than half a per cent. of the total area of the district. I give below the annual returns of the past six years for the division of this area under various trees, three ciphers being omitted in every case :—

	1281.	1282.	1283.	1284.	1285.	1286.
Cocoanuts ...	3	4	4	4	4	4
Tamarinds ...	1	1	1	1	2	1
Mangoes ...	1	1	2	1	1	1
Illupai ...	1	2	1	1	1	1
Jack ...	1	1	...	1	1	1
Total ...	7	8	8	8	9	8

These figures either show a great inaccuracy in the statistics, or a most lamentable want of energy or great ill-success in efforts at planting; the energy is highly improbable. I saw scarcely any planting going on; very few plantations of recent formation; but many very fine ones planted many years ago; this was especially the case with regard to plantations raised for the benefit of temples.

18. It is surely possible that Government might do something to induce or compel their tenants to raise more trees. The absence of wood-fuel leads to the consumption of great quantities of cow-dung, and although it might not be possible to stop the private manufacture of bratties their sale might be checked very considerably by means of a heavy impost or fine, whilst the exaction of the planting of some portion of his holding with trees of the ryot is quite feasible. The whole district being one widely-extended treeless plain with the exception of part of the Udiarpolliem Taluk, and the Puthamullays in the north-west, is open to the scorching blasts of the wind, which appears to blow hot from nearly all points of the compass, unless it brings rain with it. If at any time it should be decided to render it obligatory on the people to raise the fuel they require for their own use, one of the first things that must be insisted on is that all reserves should be completely and securely fenced in to prevent the grazing of stock of any sort. Unless precautions of this sort are taken the chances of ever raising good trees are likely to remain small.

19. The villages of the unirrigated portions of the district consist chiefly of poor mud-built, and straw-thatched houses, tiles being seldom seen and flat roofs only rarely, and then generally only in the case of the houses of some merchants or village officers. At present many roofs are in want of repair, and their condition adds to the appearance of squalor prevalent. The use of thatch is an agricultural evil; for, in supplying it, a large amount of straw, more or less valuable according to the variety used, is taken away from its legitimate destination, and feeds the white-ants instead of the cattle. These thatched roofs require constant repairs, annual ones being necessary to keep the roofs in thorough order. In the villages of the Cauvery valley the meanness of the poorer houses stands out clearer than in those of the high dry plains, owing to the greater number of good houses which exist. In this part of the country many new substantial brick-houses are being built; presumably on the profits of the famine.

20. The common dense jungle of prickly-pear surrounding the villages, which serves as a public latrine, scarcely calls for special remark, except to say that the removal of this pest is a thing which is quite within the power of the inhabitants, if they are only led in the proper way by the village authorities. I saw one instance, where by the influence of the resident Revenue Inspector a considerable area near a village had been cleared. The insani-

tary effect of these pestiferous jungles is sufficient to justify compulsion being used for the purpose of removing them.

21. In the valley villages especially most of the walls are covered with bratties placed there to dry for fuel. In the high parts of the country the manufacture of bratties of course varies just as there is an abundance or otherwise of wood.

22. In the southern portion of the district near and beyond Mannaiparai, the prevailing soil is of a reddish color, full of quartz stones of various sizes, which a little labor and industry on the part of the ryot, during the slack season of the year, would remove; by so doing he would increase the value of his land very much, but he is so deficient in energy that he allows, and has allowed these impediments to remain to obstruct his cultivation without an attempt at getting rid of them. This soil is of fair quality, free, easily worked, excepting where the stones referred to are very abundant, and favorably situated, as the country is much broken up by low hills, the drainage of which maintains the moisture in the low-lying grounds, and also fills the tanks; every little shower being of value in the last named manner. During my stay a shower of rain fell, quite sufficient for the purposes of ploughing, but the ryots would do nothing of the sort, stating as the only reason, which I could understand, that, if they ploughed it, their land would be immediately covered with weeds; even were this the case the value of getting their work forward would have far more than recompensed the possible extra expense of destroying the weeds.

23. North of this locality is a wide open plain of coarse arenaceous soil extending to the valley of the Cauvery. This soil is derived from the decomposition of the gneissic rock on which it lies, and which protrudes in a good many places. This soil occupies the greater part of the Kulitalai, and a good deal of the southern portion of the Trichinopoly Taluk; in the latter however towards the east, the soil is redder and finer, but not of greater value. Considerable areas of almost sterile soil exist in the central portion of the Kulitalai Taluk, their barrenness being due to the presence of an excess of soda salts.

24. In the Cauvery valley the soils vary considerably, but it is a matter of considerable difficulty to determine their nature without more means than I had in my power. The soils are chiefly alluvial, sometimes recent, and when so often only of a slight depth; that is to say it often occurs that there is only a bed of a foot or two of good soil above the coarse sand of the river. Messrs. King and Foote described the alluvial soils, which they classify as—

1st.—Dark humus.

2nd.—Pale, yellow, sandy soil, as follows :—

"The humus is, where dry, not unlike cotton soil in appearance, but less friable; but when wet, it has considerable plasticity, without, however, (in general) assuming a clayey character. The sandy districts, when well irrigated, are by no means unfertile, though vegetation has not quite the same unbounded luxuriance as on the dark soil. Clayey beds are very rare."

25. North of the Cauvery valley the country "is a gentle undulating tract, formed by sedimentary rocks on the east and crystalline rocks (principally gneiss and hornblende schist, with a few granite veins and greenstone dykes) on the west. The country is dry and barren, sometimes rocky, but more frequently covered with the soft black loam, known as "regur" or cotton soil, and with the red ferruginous sand, termed "lal" elsewhere. The latter soil prevails in the eastern part of our area, where it usually bears a tall thick growing jungle of *Euphorbia*, *Melastoma* and various other plants, while the former occupies the country south of the Vellar between the red soil and the hills, overlying both the sedimentary and crystalline rocks." The sedimentary rocks comprise, "several distinct groups of deposits, resting unconformably on each other, and representing in broken sequence a long geologic period. As developed in the Trichinopoly area, where they are best seen and most extensive, these groups are five in number, three of

which are undoubtedly of cretaceous age. Taken in descending order, they may be enumerated as—

Tertiary.—The Cuddalore sandstones? Exogenous plant remains in Pondicherry.

Cretaceous. { The Aryalur group, highly fossiliferous.
The Trichinopoly group, do.
The Ootatoor group, do.

The Ootatoor plant beds: plant remains, other fossils doubtful?

And to these we may add a very remarkable and interesting formation, the "coral reef limestone," which occurs at a few points at the base of the Ootatoor group, apparently formed under somewhat different conditions, but physically associated with it.

The lowest and therefore oldest beds, the "plant beds," are seen in the neighbourhood of Ootatoor, cropping out irregularly from beneath the base of the Ootatoor group, and occupying the south-western corner of the sedimentary area. From this point, if we proceed either eastward across the strike, or north-eastward along the general boundary of the sedimentary rocks, we meet with all the members of the above series successively overlapping each other, and dipping at a low angle with much regularity to the east. The highest group, a mass of fine, ferruginous grits of unknown thickness, which we have termed the Cuddalore sandstones, occupy a large area to the north-east, including nearly the whole of the Udiarpolliem Taluk, and they reoccur in Tanjore to the south of the Cauvery, where they rest immediately on the gneiss.*

Farther westwards, rising from beneath the alluvial plain with a well-marked declivity a band of crystalline rocks causes a rough and barren strip of rocky land running parallel with the Cauvery as far as the extreme west of the district. This band consists of granite, generally a binary compound of "felspar and quartz, in which the felspar is usually of a white or yellowish color, though typical granite is of frequent occurrence." The felspar is of the orthoclase (a potash felspar) variety.

"North of the granitic band the country falls away slightly, and its surface to within a short distance of the southern flank of the hills, which for about 30 miles westward of the Madras road, bound the valley of the Cauvery, is covered with 'regur' of variable thickness. These hills, as is usually the case in hill groups of this part of India, rise abruptly from the plain, and when viewed from Trichinopoly or any other distant point, appear to form an almost continuous flat-topped range running in an east and west direction, and becoming gradually more elevated from east to west."

26. The sandy soils which occupy the eastern portion of the district do not vary much in character; their color is dependent on the amount of iron they contain.

"They consist chiefly of sand with a certain proportion of argillaceous matter. The proportion of iron varies from a mere trace, in the case of the grey sand which frequently occurs at the bottom of the deposit, when the latter is of any thickness, to 20 or 25 per cent. in the case of the lateritic forms of the soil such as occur around Ambapuram on the Cuddalore sandstones to the north of the Murdayaur. The ordinary form of the soil, a red sand, contains, according to two analyses by Mr. Tween, about 2 per cent. of iron, the two specimens being respectively as follows:—

No. 1, from Mannargudi, in the Udiarpolliem Taluk, Trichinopoly District ... 2.1 per cent.

No. 2, from Panroti, on the bank of the Guddalum River, in South Arcot ... 1.46 "

which are equal to 4 per cent. and 2.7 per cent. of hydrated peroxide, the state in which the iron exists in the soils.

Varieties intermediate between this and laterite are very common. These contain small pisiform ferruginous concretions disseminated through the sand, which in an unweathered section of the soil are seen to blend off into the matrix in such a manner that there can be no doubt they have been formed *in situ*, but when washed out and exposed to the action of the air and rain, assume the shining dark-brown surface characteristic of weathered laterite."*

This soil frequently contains nodules of kunkur, especially when it rests on cretaceous rocks. Its depth varies considerably, not exceeding 3 or 4 feet on the gneiss, and usually not 1 or 2 feet. The soil is friable and easy to work, but surface cakes in the hot weather very much in the eastern part of the district. On the

* The information regarding the geology of the district has been gathered chiefly from the reports of Messrs. Blandford, King, and Foote of the Geological Survey.

granite rocks the soil is freer and not so liable to cake. In the Musiri Taluk where there is a good deal of this soil not far from the Cauvery, I saw some land already broken up (in March), but this was almost the only instance of work of the sort being done which I met with.

27. Near the foot of the Puthamullays, the washings of the hills have produced very fair soils, which also, on both the north and south faces of the hills are advantageously situated, as they receive a good deal more rain than the land further from the hills. The wells in this portion of the district also obtain a better supply of water.

28. The black cotton soil which covers a large portion of the central part of the northern section of the district varies considerably in character. "Its most characteristic form is a black or bluish black tenacious mud, which, after prolonged heavy rain, is almost impassable even to a pedestrian, while, after a long continuance of dry weather, it is seamed in every direction with gaping cracks which frequently extend to a depth of many feet." Kunkur abounds. These concretionary nodules of limestone are believed to be derived from the decomposition of animal remains in composition; sometimes being a clay, at others a stiff loam, or again a marly soil, but does not contain coarse mineral particles as a rule. As far as is known the soil contains very little organic matter, "the mean result of observations being about 4 per cent." The following is the analysis of one:—

Silica	...	...	...	...	...	...	48.2
Alumina	...	...	...	...	...	...	20.3
Carbonate of lime	...	...	...	...	...	...	16.
Do. of magnesia	...	...	...	...	...	...	10.2
Oxide of iron	...	...	...	...	...	...	1.
Water and organic matter	...	...	...	...	...	...	4.3
							100.

Where the black soil is of a marly character it is far more friable than in general. This shows how valuable would be the results of lime as a manure for most of the soils of this description.

29. In the following table, I have brought together such data, as I have been able, regarding the meteorology of the district, which is situated between 10° 15' and 11° 30' north latitude, and 78° 15' to 79° 35' east longitude. Unfortunately the data referring to temperature, &c., are the averages of only two years, and those of rainfall of six years, two of which, 1876 and 1877, were characterised by a considerable deficiency.

	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Annual.
Mean temperature ...	75.8	77.8	85.2	88.7	88	86.8	86.2	84.1	84.2	81.4	78.3	76.1	82.7
Do. pressure ...	29.613	29.653	29.586	29.495	29.477	29.463	29.471	29.496	29.526	29.570	29.647	29.686	29.557
Do. vapour tension ...	.579	.569	.643	.676	.684	.666	.635	.671	.679	.724	.688	.604	.652
Do. cloud proportions.	3.71	2.09	2.68	3.44	5.97	7.09	7.74	8.42	7.05	.783	6.79	5.50	5.74
Do. rainfall ...	...	...	...	...	...	...	...	...	...	...	...	...	...
Kulitalai mean rainfall.	...	...	...	...	...	...	...	...	...	...	...	...	...
Musiri do. do. ...	...	...	...	...	...	...	...	...	...	...	...	...	...
Perambalur do. do. ...	...	...	...	...	...	...	...	...	...	...	...	...	...
Udiarpolliem do. do. ...	...	...	...	...	...	...	...	...	...	...	...	...	...

It will be noticed that the heaviest rainfall is registered at Jeyankondasholapuram, the head quarters of the Udiarpolliem Taluk; this is probably due to its comparative proximity to the sea on the east coast. The rainfall at Perambalur is affected by the proximity of that place to the Putchamullays; but why there should be any material difference between the rainfall of Kulitalai and of Musiri I am unable to surmise, the two places being situated within 2 miles of each other. On the whole the rainfall of the district may be put down at a little over 30 inches, the greater portion of which is brought by the north-east monsoon during the months of October, November, and December, but nevertheless the district gets throughout a fair share of the south-west monsoon rains, as about 10 inches falling between May and August must be attributed to it. Early showers in April enable cultivation to commence, and it is in this month that the village astrologers are consulted to name a good day for the commencement of agricultural operations.

FARMING OF THE LAND IRRIGATED BY WATER RAISED BY MACHINES.

30. I am not able to estimate fully the area of land of this nature, but from the following figures an idea may be obtained. This statement shows the number of wells in the district at the dates referred to:—

Well.	In Repair.	Out of Repair.	Government.		Private.		Total.	
			In Repair.	Out of Repair.	In Repair.	Out of Repair.	In Repair.	Out of Repair.
1271	...	Not known.	4,285	1,802	...	...	...	...
1276	...	10,237	796	4,306	209	14,543	1,005	...
1281	...	10,336	667	5,490	197	15,826	864	...
1286	...	9,658	644	5,924	775	15,582	1,419	...

Supposing each well to water 2 acres of land, for I do not think it safe to take a higher estimate, at the utmost about 30,000 acres of land are watered from them. But it is necessary to add considerably to this area, as there are numerous water-lifts, which are used to raise water from channels, streams, etc. A considerable number of the Government wells are simply used for drinking purposes; and in a good many places the public village wells are maintained in repair by the produce of grants of land at a nominal quit-rent.

31. It is not a good sign of the progress of the country, which may be noted by the following figures, showing the proportion of wells which were out of repair at the dates mentioned:—

1276—	For every 100 wells in repair 6.91 were out of repair.
1281—	Do. 100 do. 5.46 do.
1286—	Do. 100 do. 9.08 do.

As nearly all of the last five years referred to were years of good or fair crops, this fact can scarcely be attributed to the effects of famine and must, I think, be taken to show that less care than formerly is devoted to the upkeep of existing wells.

32. What has become of the missing 700 Government wells I am unable to explain, but probably the loss may be due to inaccurate returns. It is almost superfluous to remark that these returns, unless accurate, are utterly useless, and dangerously misleading. The number of private wells returned is open to great doubt as it will be seen that there were more said to exist in 1271 than either in 1276 or 1281: and again the sudden increase in the period ending 1281 is suspicious. If we assume that the last two returns are correct, there have been about 200 wells sunk annually; a very small number considering the amount of unutilized labor which is available in most parts of the district during several months of the year.

33. The actual number of wells, when considered with reference to the area of unirrigated land under cultivation, is extremely small, and considering how important a part wells play in raising supplementary supplies of food in a droughty season, it is a matter demanding renewed attention. The fact is that well-sinking is an extremely bad speculation, and the capital sunk in digging one is laid out at a very low rate of interest, even if it in ordinary seasons pays any at all on the original outlay. But it must not be forgotten that indirectly wells are of enormous value to the country. They are an insurance against drought, as by their means when the rains fail or are deficient food for both man and beast can be raised; their value in this respect is sufficient to justify their increase even if the direct money return in ordinary seasons be small. They also cause a large demand for labor during the slack season of the year, and although the men working them do not earn more than a mere subsistence by their toil, the fact that they have not to go unemployed testifies to the value of the wells to the country at large. Being a poor pecuniary investment, as yielding direct returns, perhaps the only means of increasing the number of wells is by the aid or interference of the State.

34. The risks which attend well-sinking are also great, for a man may, after expending a considerable sum in excavating, find that he has come upon an impervious waterless strata. If he has borrowed the money for this purpose, the condition of the ryot is pitiable in the extreme. He has loaded himself with debt, and finds his labors all wasted. As this is not infrequently the result of his attempts it is not surprising that well-sinking does not go on very rapidly. To sink one well in every 15 square miles of country per annum is very little work for a population such as the district carries to perform.

35. Were the people thoroughly acquainted with the Land Improvement Act, and were advances under it made without delays, which often extend over periods so long as to dishearten the ryots from making applications, well-sinking might perhaps go on faster. But, as a very general ignorance prevails as to the Act, its working is not likely to be very active or beneficial. In some places I was informed that it took as much as eighteen months, from the time of application for an advance, before a grant or refusal was obtained. If this be correct, the Act must remain a dead letter. Certain it is that the village officials have no interest in favoring the working of such a measure, for too often it occurs that they may be the village money-lenders, and further anything tending to make the ryots more independent will lessen their influence.

36. In many parts of the district it is customary to consult with the village priest as to the best part of the field in which to sink a new well, but I did not find much faith placed in his dicta. It is usual to sink a small trial-hole, several yards in depth, before excavating the well proper. This system is a very good one, and as it involves very little expense should be encouraged; but at present the ryots do not carry these trial-sinkings nearly deep enough, and consequently they are often utterly useless. If these holes were sunk to the full, or nearly to the full depth of the intended well, the expense, in general, would not be heavy, and the advantages would be very great. I think that it might perhaps be possible for Government to do something in this way for those applying for money under the Act, so as not to place them in danger of having to repay money which they might expend on sinking a well which ultimately proved a failure. This system of trial-holes is I think easier to work, especially in a country where the substrata are not generally sand, than the one of employing well-augers; it is also simpler, and requires no trained labor.

37. Another obstacle to progress in well-sinking is the utter helplessness of the ryot himself in performing the work. I was often told by men, whose wells evidently wanted deepening, that they could not do the work themselves, although they had plenty of spare time. They required professional well-diggers for the purpose; as if any able-

bodied laborer could not dig with a manvetti and crowbar, and by a little work every day so deepen his well as to render his water-supply constant, or at least to vastly improve it. If the ryot will only employ professional well-diggers, of course the expense of the work is enormously enhanced, and less likely to be carried out, as the ryot then has to draw on his money-capital, in which he is so deficient, whilst if he only did the work himself, the great reserve of capital, which he possesses in the labor he and his family can afford, would be usefully employed and well invested. The incapability of the ryot in this respect is strikingly illustrative of his character for an undeviating attachment to custom.

38. Whether or no Government could do anything towards the compulsion of its tenants in well-sinking is a point I am not able to speculate upon; but it is quite certain that much more ought to be done towards the increase in the number of wells. Customary labor used to be exacted from the ryots for the upkeep of tanks, and is exacted still in some places, and I do not see why their power of doing good to the country should not be turned to good account in increasing the means of tapping our sub-soil water-supplies. It is surely as just to exact labor for the latter purpose as the former; and further in the latter Government would be conferring a benefit on the people from which the State would derive no direct revenue, whilst in the former case the labor is devoted to the maintenance of works, the upkeep of which is desired in order that the higher rent demanded from irrigated lands may not be lost. Although the institution of customary labor must have commenced very long ago, yet the fact that it exists proves that its inauguration was the work of some Government. The tanks and channels, which are now repaired by forced labor, must have been the work originally of some power superior to the village or purely local authorities; and it is difficult to see the objections which exist to the proper organization and direction of the now wasted labors of the cultivating classes in a matter of such great import to the country, and to the people themselves. The amount of unemployed labor in the villages of the high unirrigated portions of the district during some months of the year is very great. That it should be employed in some work for the benefit of the country is almost self-evident. When there are any large public works in progress, work is of course supplied, but ordinarily these works do not demand much of the surplus labor available. At home if it were not for the work supplied by large land-owners, the agricultural laboring population would suffer sadly. The landlord is the largest employer in his district, and thus maintains many families, who would otherwise have to leave the country or starve.

39. Perhaps it might be possible to sink, at the expense of the tenants, wells in every village sufficient to keep its whole population in full work during the dry weather. The State finds the capital for the construction of large works of irrigation; why should it not find, and work the capital for sinking wells? The labor of its members is the property of the community. Why should this labor not be made use of, and devoted to such a practical benefit as well-sinking? The practical difficulties of Government doing anything to extend well-sinking are I know very great; but it appears to me that the people require something more than the inducements of the Land Improvement Act to lead them to add to the resources of the country in this manner.

40. In several places I found men paying 12 per cent. per annum on the money they had borrowed to sink their wells. At such a rate the rent-charge is overwhelming. In many cases the wells, which are generally large holes, about 20 feet square, dug often in solid rock, cost as much as Rupees 500 to 600. This would represent a charge of Rupees 60 per annum, or about Rupees 20 to 30 per acre irrigated from the well; sometimes more. The increase of crop is very small in proportion to such a charge. The first-class permanently improved land, with Government wells, is let at only Rupees 3-8 per acre, unirrigated lands of similar quality are let at Rupees 1, so that from the figures gathered in the settlement, the Government

share of the increase of crop due to the presence of wells is only Rupees 2-8 per acre, or a gross increase of Rupees 5 per acre, after deducting all the expenses of cultivation. The contrast between the charge (Rupees 25) and the revenue (Rupees 5) is more than sufficient to explain a great deal of the slowness of the extension of well irrigation.

41. A considerable number of wells in the district are sunk in the land irrigated from rain-fed tanks, by this means the cultivators are able often to raise two crops in the year instead of one, and always to make certain of some crop. This practice is a good one, considered from the revenue point of view, for it renders the payment of the rent more certain, and for this reason should be encouraged. It should also be encouraged on the same grounds as well-sinking generally.

42. The chief crops grown with water raised by machinery, are raggy (*Eleusine corocana*), tobacco, cholam (*Sorghum vulgare*), cumboo (*Pennisetia spicata*) and vegetables, paddy being also grown to a considerable extent under irrigation of this description. There is very little in the system of culture on this class of lands to be worthy of special note. The lands are certainly manured fairly well, as the ryot puts most of his manure on this land. No system of "rotation" is followed, although the cropping varies to a certain extent.

43. It is worthy of note that the rice obtained from the paddy grown on these lands is more highly prized than that raised under the deluging process on the swamp lands of the valley. The higher class natives prefer this paddy as having some flavour in it, whereas the valley paddy is said to be insipid and tasteless. That this should be the case is not surprising to any one acquainted with the effects of over-irrigation, for, as I pointed out in my paper on the "Supply of water to the soil" last year, the loss of flavour consequent on the copious application of water to crops during their growth is a well-known fact in countries where irrigation has been studied. This fact shows that the unlimited waste of water, in their ordinary irrigation, is not wholly to the ryots' own advantage; by it they get larger crops but the produce is neither so savoury nor probably so nourishing.

44. Most conflicting customs exist as to the time of year best suited for sowing the different cereal crops. So much is this the case that I have been led in a measure to believe that the ryot has but little idea of the crop most fitted to certain seasons; just as he has small knowledge of the suitability of different crops to soils of varying character. As far as I can understand, from what I saw of the country during my tour, the present system or ideas of cropping have arisen mainly from chance; but that the crops grown, owing to the universal absence of any practice of changing the seed, have become so habituated to the soils on which they are cultivated, that they do well; and in the same way with the season for sowing.

45. The area cropped with tobacco in the district is not very large, 1,500 acres; most of the celebrated Trichy cheroot-tobacco, coming from the Madura, Coimbatore, and Tanjore Districts. This crop, which is excellently suited to the habits of the people, and to the abundance of labor which exists, receives a very considerable amount of attention from the ryots during its growth. The preparation of the soil for planting requires a good deal of labor, and is an extremely expensive operation with the ordinary country plough. As many as 15 to 18 stirrings are given. In some places a special large description of plough is used. I found in some places that a depth of as much as 9 inches of soil had been stirred, but it was most exceptional, and the practice is far from being a common one; this was on the bank of the Coleroon, down which the cultivation of the crop appears to be extending. The crop is said to require double the amount of manure usually given to garden crops; this manure usually consists of sheep manure dropped whilst the sheep are penned on the land at night. The use of saltpetre is not known, although that substance is very abundant in some parts of the district, and salt of a very high quality manufactured. This manufacture is chiefly carried on in the western part of the district, and especially near Musiri. During its growth, the crop is weeded and hoed several times, and the

earth is heaped up around the plants. It is watered about once in every five or six days in the usual manner. It is cut when the leaves begin to spot, and the plants are then either hung up to wither in the shade or are laid on the ground, and covered with varagoo straw. A system I found in vogue in one place was as follows:—the plants after cutting were spread on the ground and left covered with straw during the heat of the day, and uncovered at night, for fifteen days; after this they were exposed to the sun for two days and then packed in heaps in a room for a month or two; the heaps being turned as found necessary, generally about once a week. After this the leaves were separated from the stems, tied in bundles, and sold. The produce of an acre is of course subject to great variation; as also is the price; the latter varies from Rupees 12 to 45 per bullock load.

46. The regular garden-crops occupy about 11 or 12,000 acres, they consist of plantains, betel-vines, sweet potatoes, miscellaneous vegetables, and chillies; the latter are also largely grown on unirrigated lands.

47. Plantains are grown chiefly near the villages and are not much cultivated outside the Cauvery valley; the same may be said of betel-vines. The plantain gardens are laid out in beds about 18 feet x 12 feet, with trenches about 1 foot in depth to mark the boundaries of the beds, which serve the purpose of carrying the water required for irrigation. This crop is kept on the land about three or four years at a time; three or four crops of fruit being obtained during that time, the first being cut eighteen months after the planting, and the others at intervals of ten months afterwards. When cultivated properly, according to the local idea, the land is dug over once in every three or four months, but in practice this is often neglected. The depth to which the land is dug rarely exceeds 1 foot, and is generally not above 9 inches. The crop is also often manured several times during its growth, but the practice varies very much. When cultivated near a large town, like Trichinopoly, large quantities of manure are applied.

48. Betel-vine cultivation is very costly, owing to the enormous amount of labor which it requires; so much so that if the growers of the crop could be believed they produce it at a dead loss. It is always grown by sub-tenants, who have not to pay for hired labor, and as it demands constant attention can only be grown on such a system. If the labor used were paid for, notwithstanding the great value of the produce, it would be an unprofitable undertaking to produce it. This crop requires constant watering, and heavy manuring to make it yield well.

49. Of the other crops grown in gardens there is not much to remark in particular; they all receive manure of some sort; turmeric in particular requires a very heavy dressing and its cultivation is therefore restricted to a small area.

50. Sugarcane is grown chiefly on irrigated lands, but it is like plantains, and the betel-vine, a garden-crop. The following table shows the areas occupied by the crop during each of the twelve years referred to:—

	1276.	1277.	1278.	1279.	1280.	1281.	1282.	1283.	1284.	1285.	1286.	1287.
	ACS.	ACS.	ACS.	ACS.	ACS.	ACS.	ACS.	ACS.	ACS.	ACS.	ACS.	ACS.
Irrigated land ...	718	2,180	2,623	1,670	2,263	2,771	2,635	2,532	1,779	1,864	1,477	875
Unirrigated land ...	118	280	267	152	221	321	442	195	296	211	306	420
Total ...	836	2,460	2,950	1,822	2,484	3,092	3,077	2,727	2,075	2,015	1,783	1,295

It will be seen that the area under the crop has been gradually declining of late years, and as this decline has been a steady one may be expected to continue, unless some new inducement should arise to render the cultivation of the crop more

enticing to the ryots. The greatest area under the crop is in the Trichinopoly Taluk north of the Coleroon; but patches of it are scattered all over the district. The former locality is almost the only one where sugar is manufactured to any extent. The decreased area under the crop is to be deplored, as its cultivation is, amongst the usual practices, well conducted of necessity as the crop will only produce if fairly well treated. The unprofitableness of it under native farming may perhaps be due to an insufficiently generous system being adopted. This crop is never taken on the same land in successive years; the interval between the crops varies from two to four or five years, during which time the land is usually cropped with paddy or some other graminaceous plant.

Sugarcane is heavily manured and is perhaps nearly the only crop that is fairly well treated by the ryot. But I was much struck by observing the practical indifference to self-evident results which characterises a sugar-planter in the village of Abishaygapuram in the Trichinopoly Taluk. A plot of cane occupying a spot close to the village showed on its two sides most different results. On enquiring the cause I found that the portion which had grown well, and it was a very fine crop, had been inadvertently manured with human excreta. Had the ryots much appreciation of results, it would have been likely that some of them at least would have read the lesson before them and acted on it. But no, disgust at such an idea was the only reply which I was able to draw forth from a suggestion to utilize the manurial capabilities of the population there; which is very thick. If an absurd prejudice will prevent the ryot from adopting a means which lies in his power, the nature of which has been demonstrated under his very nose, on the lands of one of his fellow-cultivators, how can we expect him to copy practices, however good in themselves, which he may see adopted in Government institutions with even the greatest success; for he looks on all Government operations with a suspicion which is almost insuperable!

The juice is extracted from the cane by means of the common country wooden sugar mill, which it is almost needless to say is a very rough and inefficient machine. The juice obtained is full of all manner of impurities. It is boiled down on the spot, a little lime-water being added as a rectifier to the acidity of the juice, and the product is the common jaggery of the bazaar.

51. I was given in one place the following figures regarding the amount of water required daily per acre by a paddy crop grown by irrigation from wells:—

On red sand	...	...	...	...	3,750 cubic feet.
On black loam	...	...	...	...	2,900 do.
On black clay	...	...	...	...	2,300 do.

This knowledge of the differing requirements of soils of varying composition is quite in accordance with the teachings of science; but although I found that this knowledge exists, it was only in one place that I met with it. It shows certainly that when the ryot has to raise the water his crops require by machinery he can appreciate its value and economise. Why he should not be obliged to do so when the State goes to the expense of giving him copious supplies, is not an easy question to answer. This care of water is most praiseworthy; but as it is only practised in such cases as it would be a dead loss to do otherwise, the motive for doing it is not far to seek. Had the ryot always to pay for what water he used, he would habitually take greater care of it. As it is the economical use of water is, although not an unknown, almost an unpractised custom. Even in the case referred to the amount of water used is, I believe, much more than is absolutely required for the proper growth of paddy; whilst for other crops, such as wheat, cholam, &c., a far smaller quantity would suffice. The information which I have noted was obtained at an out-of-the-way village, not far from the Salem border, in the north-western part of the district.

52. Generally speaking the cultivation under well irrigation is carried on by sub-tenants, who work for a share of the produce, usually one-half. The labor of

raising water is so heavy that the Government tenants, unless they be men of small means themselves, seldom care to undertake it. If the cost of raising the crops by this system of irrigation be calculated, the daily wage earned by the laborer is extremely small, probably not more than one anna. He is however, as I have said before, provided with something to do during a slack season, and is so enabled to keep the wolf from the door. This is, I believe, the point of view from which the ryot looks upon the value of wells.

53. Generally speaking water is raised almost entirely by the picotta, or lever lift, excepting in the Musiri, and in some parts of the Kulitalai Taluk. The picotta is of a peculiarly heavy and cumbersome description; it usually requires from four to six men to work it, and contrasts most unfavorably with that in use in Bangalore, where with double the lift, a man works by himself. The bucket in use is however a very large one, probably holding not less than 2½ cubic feet of water, so that the weight to be lifted is considerable (about 160 lb.); two men, or at the most three, on the lever ought to be able to do this work, and so they might were it not for the clumsiness and weight of the lever itself, which is generally made of a single, or of two solid pieces of heavy wood and consequently the swinging of it is very bad, and the friction very considerable.

54. The single mhote is at work in some parts of the district, but only in the west. In the Musiri Taluk I saw a good number of them, and it is a matter of general complaint that they wear out the cattle employed in them very rapidly; notwithstanding that the yoking is short, probably not over four hours per diem, and the buckets used small. The slope down which the cattle run when lifting the bucket is generally about 1 in 8 to 12, generally about the latter figure, and backing up this is evidently a severe strain on the cattle. By these lifts about 130 buckets can be raised 16 feet in an hour, each discharging about 1½ cubic feet. The buckets generally in use are made of iron, with leather mouth-pieces, the wholly leather buckets not being liked, owing to the cost of renewals and repairs. The ropes are home-made of roselle fibre; one large rope (the upper and lifting one) is required for each crop, at a cost of Rupees 1-3, and two thin ones (the one attached to the mouth-piece) per mensem, at a cost of 5 annas each. The mhotes are not much liked by the people owing to the wear and tear of the stock entailed in their use; this would be avoided by the use of the double mhote with its circular walk on the level. I was informed in one place that a pair of cattle worth Rupees 35 would after a season's work in a single mhote be depreciated by 40 per cent. in value. The reason why the use of mhotes has extended of late years is the decrease in the numbers of the laboring population owing to deaths from famine and losses by emigration.

FARMING ON THE IRRIGATED LAND.

55. The area of rent-paying land in the district which is irrigated by rivers or tanks was, in the periods referred to, as follows:—

During the period of		Average extent in Acres.	Average Rent per Acre.
			RS. A. P.
Three years ending 1276	...	125,707	4 3 10
Five do. 1281	...	131,594	4 3 3
Five do. 1286	...	135,623	4 2 11
Increase in ten years	...	9,916	...
Increase in per cent.	...	7.9	...
Decrease in ten years	...	...	0 0 11
Decrease in per cent.	...	...	1.35

The average extent of actual cultivation was during the same periods :—

	Pash.	Acres.	Per cent. of the Occupied Area.
1276	...	119,610	33.95
1281	...	120,694	33.69
1286	...	122,100	34.66

56. Of the total area of cultivated irrigated land about two-thirds (80,000 acres), are watered by channels taken off from the Cauvery. The upper anicut, which dams the Coleroon waters back and throws the main body of the stream into the Cauvery channel for the benefit of the seaboard province of Tanjore, only benefits portions of the Trichinopoly Taluk. It also has not infrequently caused breaches of the river banks near the spot where it is built, and by this means flooding the country for many miles. Besides the Cauvery irrigation there are minor channels from some small streams and rivers, and a considerable number of tanks, chiefly shallow rain-fed ones. Here I cannot refrain from remarking on the magnificent tank which once must have existed in the extreme east of the district. The bund of the Ponneri tank, now ruined, must once have held an enormous body of water behind it, and have watered a rich country below it. The soil in its neighborhood is especially fitted for irrigation. If in any way it could be restored, a population now so poor as to feel the slightest failure of crop, would be placed in a position which would rival that of their near neighbours in South Arcot and Tanjore. The great areas occupied by the shallow tanks is a matter deserving attention. It is a question whether, if their area were devoted to the production of organic manure, they would not be a more certain protection from the effects of a drought than they now are.

57. One of the most glaring defects of the system now in vogue in the district in the cultivation of these lands is the utter want of care in the use of water. The enormous amount used by the ryots in growing paddy is a most unjustifiable waste of means. It is customary on the Cauvery valley lands to maintain constantly in the paddy-fields, until close on the time for harvest, from 2 to 6 inches of water, making good by daily additions the losses by infiltration and evaporation, which are said to amount to at least 1 inch in depth. The quantity used probably is not less than a volume from 10 to 15 feet in depth, an amount which, under careful management, would suffice for three times the area of paddy now watered in this manner. Such waste should be checked.

58. In the Trichinopoly Taluk regulating dams exist, but they are not worked on the principle of supplying to given areas the water sufficient for their requirements. They are simply used to prevent the undue consumption of water by villages at the heads of the channels to the detriment of those farther down. Undoubtedly the cultivators place a very high value on Cauvery water for the silt it brings down during the freshes, but during the greater part of the year there are no freshes. When freshes do come down there can be no objection to the ryots letting an unlimited quantity of water into their paddy-fields if they like to, but when only the ordinary stream of the river is flowing such an excuse does not exist. Whilst the river water, a public property, is used in such an extravagant and wasteful manner in a small portion of the district, there are often thousands of acres of crops, situated on a slightly higher level than the present valley paddy-fields, which of course often suffer most severely from a deficiency of moisture in the soil. One of the first things that struck me is that it seems to be both unwise and injudicious to allow so much wealth-producing power to be so utterly wasted as it is in this district in the growth of paddy.

59. That the rivers could be dammed across at some part of their course further inland must surely be the case. If this be possible, it is self-evident that, in the interests of the country at large, it would be wise to make some effort to prevent the water, which is

Better utilization of resources necessary.

so much wanted on the higher lands, from flowing down into a delta where its utility is limited by local conditions, the irrigable area being there very small, comparatively speaking. Even on a small scale much might be done to utilize more fully the waters of the Coleroon, which now flows for some 60 miles between the upper and lower anicuts with scarcely any attempts being made to utilize the waters which flow down it; during freshes especially this river carries away a great deal of fertilizing matters to the sea. Again in the Cauvery above the upper anicut there are numerous river-irrigation channels which require at present most frequent clearings of sand to keep them in working order. For the latter purpose a great amount of labor is annually wasted, though the object in view could be far more easily attained by the levy of a rate on the irrigated lands, which the ryots profess themselves perfectly willing to pay, and the maintenance thereon of a suitable establishment for the purpose. Such a system, although only a voluntary cess is levied, is in force in the Trichinopoly Taluk. It should be extended to the whole area; and be leviable when asked for by a majority, as regards the area they hold, of the cultivators anywhere. At present it is only leviable when the whole of the renters under any work ask for its imposition.

Waste of labor on repairs of minor channels of Cauvery.

60. One very good means of checking the present waste of water exists in the plan of only supplying a certain quota of water to each village, and then to charge very heavily for any excess used. The regular allowance should be fixed at the quantity usually required to mature a crop, not to manure it. By such a means waste would be checked, the ryots would be forced to practise a better system of agriculture, and it would be possible to extend the benefits of a supply of irrigation water to a far larger area than at present.

61. In considering the question of the proper utilization of the water available, it may be said that the interests of those at present enjoying the benefits of the water would be interfered with; but this is, I believe, a mistake. Certainly were the present supplies of water cut off the ryots would not be able to use such enormous bodies of water on their paddy crops as they do now. But such waste need not be allowed, nor need irrigation water be devoted to a crop of such low type as the paddy crop. Raggy and maize neither require more than one-seventh of the water which paddy does, and are far better food-producers.

62. Almost the sole crop of the irrigated lands is paddy. In some places raggy is taken as a first-crop early in the year, but only where wells exist. Near the large villages plantains are grown, and in some places betel-vines. Sugarcane occupies about 1,500 acres of this description of land, but its cultivation has been referred to in another place. Indigo is also grown as a second-crop on about 100 acres of this land in one portion of the district an utterly insignificant amount when contrasted with the actual area of cropped-land. A little gingelly is also raised in some places as a second-crop on paddy lands.

63. There are about 55,000 acres of double crop irrigated land in the district, a very considerable portion of which yields two crops annually without fail. It is a common practice to sow after the harvest of the second-crop, before the soil dries, some seed of a pulse (*Phaseolus*) and it often produces a third crop. The growth of this plant is a good practice, but if the ryots used the haulms for manure, or for fodder on the land, it would be a far better one.

64. As has been shown there is practically no "rotation of crops," as understood in civilized countries, practised on these irrigated lands; they being almost exclusively devoted to the growth of graminaceous crops. Did the area under indigo bear any considerable proportion to the total, a very fair system of rotation, for the circumstances of the case, would exist. No doubt the high prices of food-grain of late years have reduced the area under this crop, but it never occupied a large area. I was told by the tenant of a considerable area near Nochyem, that he had formerly grown the crop, but that, although

he found indigo profitable, with paddy selling at its present prices, the latter crop was more remunerative, and less difficult to grow.

65. The amount of manure used for the irrigated lands is very small. A tenant will apply a few thousand pounds of leaves to perhaps one-sixth of his holding annually, but he, excepting outside the valley lands, trusts almost entirely to the

Amount of silt deposited. Cauvery silt, which during the freshes is most abundant. The amount of silt deposited is often so great, that, to prevent their land from rising too high for convenience in watering, the ryots excavate pieces in parts of their fields and remove the soil to a heap in some corner. These heaps in some places are very large. I saw some 18 feet in height; and the cost of the work forms a considerable item in the expenses of the ryot. Small quantities of dry cattle-dung are used in places; but, as owing to the absence and difficulty in obtaining firewood, the consumption of cow-dung for fuel is enormous, the amount available for manure is very small, and the area so manured insignificant. Portions of the land irrigated by rain-fed tanks are occasionally manured by folding sheep, but no great area is thus treated.

66. The silt of the river water is highly prized. The quantity deposited is very great,* and, although I have no figures to show the actual percentage in the water at different times, it is quite clear that but for this supply the river irrigated lands could not support the crops they do, were it not for the river and its fertilizing floods. The people in the valley owe little to their own endeavors, nearly all their wealth being a gift of nature; a gift the utilisation of which to its fullest extent few of them attempt. Very few of the cultivators do anything more than simply plough and sow the lands they occupy—nature does all the rest.

67. I saw and conversed with some of the best and most energetic ryots, who cultivated valley lands; they informed me that the chief points which were demanded in their system of cultivation were:—

- 1st.—To level the land thoroughly so as to enable the water to cover the whole of the fields.
- 2nd.—To maintain the intervening banks between the fields properly, to make them straight and strong.
- 3rd.—To keep the land during the growth of the paddy-crop, if possible, continually under water.
- 4th.—To plough the land thoroughly and as deeply as possible.
- 5th.—To allow the land to dry as completely as possible after harvesting the second crop.
- 6th.—To use what manure they can.

But on asking them what was the usual practice, for most of their maxims are very good, and if acted up to would denote a very fair agricultural system, I was informed that most of the Government tenants, excepting those of small means, were either non-resident or took no care in the cultivation of their holdings. That the fields were not properly levelled, and consequently the crop was patchy. That the intervening banks were crooked, small and weak. That the care bestowed on watering was small. That the sub-tenants or serfs of the tenants were satisfied with only a very little ploughing. In fact that almost every point, the necessity of which is insisted on, was neglected, and that the cultivation was perfunctory, bad, and unsatisfactory.

68. I met with one man who some years ago came into a holding of about 160 acres of fair valley land, which was then burdened with a debt of Rupees 40,000;

* Probably during the freshes the Cauvery water contains not less than 50 grains per gallon; at this rate for every inch in depth of water applied to the land, 1½ tons of silt would be. Several tons of silt are therefore probably deposited annually per acre.

he was at the time non-resident, but finding that he could not properly superintend his work when he had to travel several miles to and from his land, he took up his residence on it. He has since payed off the debt, saved some money, and what is more has increased the produce of the land he occupies by 48,000 Madras measures, or about 700 lb. of paddy per acre, by adherence to the maxims mentioned above. But what is one amongst so many! I only met two such cultivators in my whole tour. If there be one good farmer, according to his lights and information, amongst ten thousand bad and excessively bad ones, what can be said of the agriculture of a country but that it is bad; and does not this instance show that the force of

Example not copied by the ryots. example is very weak in this country? Here is a man, who, by care and the exercise of common sense, has raised himself from indebtedness to independence, surrounded by many who seeing his prosperity, never attempt to copy him. The apathy with which the neighboring cultivators look on and see one of their own race prospering by such means, almost precludes a hope of their copying from a Government institution.

69. The third maxim mentioned is, I believe, a mistaken one; both from the point of view of the community, and from that of the farmer. In the first light it tends to limit the area of possible irrigation, and this makes a greater area altogether dependent on the local rains; in the second the land loses the beneficial action of alternate drying and wetting, expansion and contraction, aëration and flooding.

Effects of bad irrigation. Were it not that most of the Cauvery valley soil has a splendid natural subsoil drainage, such a system would be disastrous, and even in some places in this valley it has a bad effect, where on the borders of the alluvial belt the drainage is imperfect, saline efflorescences are the dread of the ryot, and his only means of combating them is to use so much water that by excessive dilution the injurious salts are rendered innoxious. It also necessitates the observance of the fifth maxim, to allow the land to recover from the effects of such a prolonged submergence as it periodically undergoes. The necessity for allowing the land to dry would never occur under a proper system of irrigation.

70. Regarding the ploughing of the land the practice and the precepts of the ryots are as much at variance as usual. There is a Tamil proverb to the effect *Ploughing.* that the value of ploughing depends not on its width but on its depth. This is very true but, not being acted up to, cannot be taken as indicative of a good agricultural practice in the country. In this, as in most other things, the ryot is fonder of telling you what he ought to do, than of doing it. I had very few opportunities of seeing any ploughing being performed, but I should, from what I did see, be inclined to estimate 4 inches as an outside depth attained "in the puddle," measuring from the top of the liquid mud, when of course the actual depth of soil stirred is much less.

71. An almost universal aversion exists to ploughing paddy land immediately after the harvesting of the crop, even where sufficient moisture is present. I was perfectly unable to appreciate the reasons for this aversion, and unless it can be explained by the fact that, if the surface soil were broken up, the drying of the subsoil would in a measure be prevented; it being well known that a fine, and free surface soil prevents in a great measure evaporation from below. If this be correct, the loss of such opportunities of thoroughly stirring and comminuting the surface, and thus exposing it to the influences of the atmosphere, must be attributed to the bad system of irrigation practised. Besides the loss in the manner mentioned the opportunity of getting the work of cultivation forward for the next season is sacrificed. It is true that under their present system, the cattle of the ryot are seldom fit to perform any work for some months after their cultivating season is over, but in this respect the remedy is very easy.

72. Nearly, if not quite, all the paddy grown in the district is either sown or planted in the puddle. In preparing the puddle it is considered most necessary that the whole should be thoroughly reduced to a semi-fluid state. *System of growing paddy.* To perform this successfully the land must be under water, to soak, for a few days between each ploughing. The number of ploughings which is

desirable is about six, and it thus takes about 24 pairs of cattle per acre, working one day, to complete the ploughing. Besides this there is a certain amount of manual labor required to trim up the intervening banks, and to dig the corners where the ploughs will not work. If leaves are applied at all they are pressed into the mud after the last ploughing, and as soon as the water covering the field has sunk to about $\frac{1}{2}$ inch in depth, either by evaporation or by draining it off, the seed is sown broadcast, or the seedlings are planted. The amount of seed used is very large. If the land is to be planted, about 100 lb. of seed are used per acre, if it be sown broadcast 25 per cent. less is required.

73. A large portion of valley lands are cultivated by sub-tenants. These sub-tenants are generally paupers. Often they do not even possess any stock, or only stock which has been sold by the richer ryots as worthless. They pay varying rates, but chiefly in grain, often giving as much as 75 per cent. of the produce for the right of cultivating for one year. They then are supplied with seed, cattle, and ploughs by the Government tenant, only supplying the necessary labor themselves. It is a matter of general repute that under their cultivation the land rapidly deteriorates in value. I found in some places as many as three sets of tenants occupying the land. First the Government tenant, non-resident, who sublets his whole occupation to a contractor at a rate about double the Government rent; and then the latter relets the land he contracted for in small lots to the actual cultivators, who are generally paupers. No general system of subletting exists, but there are three different ones prevailing generally—

- (1). Subletting for a money contract.
- (2). Do. for a grain do.
- (3). Do. for a share of the produce.

The sublettings are all annual, but as often there is an uncleared balance against the sub-tenant, they are frequently of long duration.

74. Where men of means cultivate their own lands, they have to maintain a large force of laborers permanently; the number of course varies greatly, but I think that one man for every 3 acres is about a fair average, besides extra hands for planting, and harvesting. These men supply the drivers of the cattle. One plough of cattle will cultivate, according to the best manner, about 5 acres of irrigated land, but the work soon kills off the stock, which has to be constantly replenished from the unirrigated parts of the country.

75. My own opinion of the agriculture of the irrigated lands is that it is much inferior, even to the backward farming of the unirrigated lands. The crops grown though fair are not large. According to the settlement statistics the highest outturn for a single crop, on the best land is only 2,295 lb. or about 45 bushels. Such a yield from land so favorably situated is in reality a poor one, especially when the enormous expenditure of rich water is considered. Carelessness of natural resources, and waste of the benefits which nature has conferred on them are two great transgressions which the cultivators of the valley lands are guilty of. Their remissness in these respects is terrible, but I learn from competent authorities that the productiveness of the lands they rent from Government has been decreasing, so that their neglect of the trust which has been committed to them by the State has met with its own reward, and did not the loss of produce affect the whole country their punishment might be considered to be adequate.

76. Before concluding this portion of my report, I would draw attention to the following figures. The statement below gives the number of works of irrigation in the district at the times mentioned:—

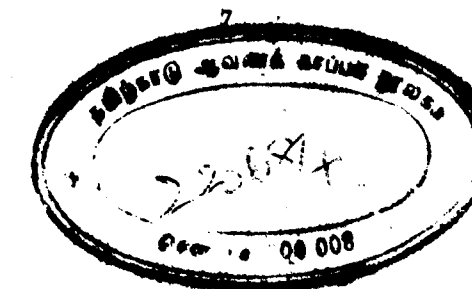
Year.	Tanks.						River and Spring Channels.						Anicuts.					
	Government.		Private.		Total.		Government.		Private.		Total.		Government.		Private.		Total.	
	In Repair.	Out of Repair.	In Repair.	Out of Repair.	In Repair.	Out of Repair.	In Repair.	Out of Repair.	In Repair.	Out of Repair.	In Repair.	Out of Repair.	In Repair.	Out of Repair.	In Repair.	Out of Repair.	In Repair.	Out of Repair.
1871	728	65	1,656	185	2,384	240	586	18	667	6	1,353	24	66	14	81	1	97	15
1876	930	122	945	163	1,965	284	725	42	126	3	851	45	77	5	12	2	89	7
1881	898	144	987	179	1,835	323	728	39	126	3	854	42	77	5	9	5	86	10
1886	815	77	502	34	1,317	111	674	48	67	2	741	50	75	7	10	3	85	10

The figures show that in fifteen years the following changes have taken place. There are now twelve less useful anicuts, or a reduction of nearly $12\frac{1}{2}$ per cent. This loss of river dams, as they tended to utilize the supplies of river water, which must now flow away to the sea, or to lands on lower levels than where they were formerly utilized, is a mark of less careful husbandry of the natural resources of the country.

There has been a loss of 511 channels, chiefly river channels, or a reduction in their number of about 40 per cent. There was in particular a sudden disappearance in 1286 of over 80 "spring channels": such works can scarcely have disappeared *en masse*. There has been also a decrease in the number of tanks, which serve the purpose for which they are intended, of 1,067, or about 45 per cent., besides a decrease of 129 of the useless tanks. Of this decrease 516 tanks in repair, and 212 tanks out of repair disappeared in the five years ending 1286.

77. These figures, although they may be capable of some explanation, owing to new classifications, &c., would lead any one, who is unassisted by acquaintance with such details, to the conclusion that the energy of the people, in working for the improvement of the lands they occupy under a tenure of unparalleled security, is not to be seen in their constructing minor irrigation works, for which they possess such great advantages. The fact is, I believe, that the people have grown, if in former times it was otherwise, to look to Government for everything in the way of permanent improvements. This may be right, considering the position which the State occupies in this country "as proprietor of the land" receiving a "rent which in European countries would be absorbed by landlords with exclusive private rights of property, but which in India, by immemorial custom, is enjoyed by the State as sole proprietor, or as joint proprietor with others."

78. One very peculiar, but generally observed, superstition obtains in the district with regard to the sowing of the paddy crop. It is considered to be peculiarly unfortunate, if not provocative of ruin, to sow a field on four days of the week whilst on the other three it is quite safe to do so. The absurdity of such a superstition is too great to need demonstration. It is of course possible that time and education may remove any such an idea, but the work of inducing men, who will adhere to such self-evident humbug, to alter their customs must be most arduous. If under the influence of their priests, the ryots will maintain a practice, which experience must show to be prejudicial, it is not likely that they will be easily weaned from customs which they have followed from their childhood.



FARMING ON THE UNIRRIGATED LANDS.

79. That the farming of this class of lands is of far more importance than that of any other is self-evident. The areas of land of this description paying rent to Government at the respective periods is shown in the following table, as also is the average rate of rent per acre:—

During the period of		Average Area Occupied.	Average Rent per Acre.
		ACRES.	A. P.
Three years ending 1276	...	715,941	15 3
Five do. 1281	...	857,070	14 11
Five do. 1286	...	816,355	14 11
Increase in ten years	...	100,414	
Increase per cent.	...	14	4
Decrease in ten years	...	...	
Decrease per cent.	...	...	2.2

But in the year 1273 the acreage occupied was 575,737, and in the year 1287 839,852 acres, so that in reality the increase has amounted in fifteen years to 264,115 acres, or at the rate of 3.10 per cent. per annum. The average Great increase of rent during the same period has fallen by 3.24 per cent., showing that not only is there a far larger area paying rent, but that the lands rented are of a poorer average quality. The low rates of rent introduced after the settlement in 1274 led to an enormous extension of cultivation. The largest area paying rent was occupied in the year 1279, when 912,164 acres yielded revenue; after this there was a severe reaction for three years, since when the extension has again commenced and proceeded gradually.

80. The average area of the lands actually under crop during the same periods is shown by the following figures:—

		Acres.	Per cent. of Occupied Area.
The period ending 1276	...	641,572	89.61
Do. do. 1281	...	791,794	92.27
Do. do. 1286	...	669,160	81.97

These figures show that at the present low rates of rent, the ryots consider it to be worth their while to retain hold of a very considerable area (about 150,000 acres) of land without cultivating it in order to prevent others obtaining it. It is also clear that there has not been any very material increase of cropped area in the district, although the area of land under the plough is now much larger than formerly. In the figures which I have already given no very marked increase of actually cropped area is shown, but there has been in the last twenty years a great extension of the area under crop. This also shows that the demands of the increasing population have not been met by increased production per acre, or in other words by improved farming, but by simple extension. In the year before the settlement was introduced the cropped area was 121,000 acres less than it now is. There has therefore been, in fifteen years, an increase of the cropped area amounting to 23 per cent., and a corresponding decrease in the untitled, pasture-producing area. It will therefore be seen that a larger portion of the area under cultivation is now left waste, to recover from the effects of the exhaustive cropping to which it is submitted. This is supported by the following figures:—

Farming not progressed. settlement was introduced the cropped area was 121,000 acres less than it now is. There has therefore been, in fifteen years, an increase of the cropped area amounting to 23 per cent., and a corresponding decrease in the untitled, pasture-producing area. It will therefore be seen that a larger portion of the area under cultivation is now left waste, to recover from the effects of the exhaustive cropping to which it is submitted. This is supported by the following figures:—

	1281.	1282.	1283.	1284.	1285.	1286.
Acreage of crops grown ...	1,065	1,013	996	1,008	998	942
Do. of waste ...	148	159	179	191	204	243
Acres of waste for each 100 acres of crop.	14	15.7	18	19	20	25.8

Leaving out of consideration the year 1286, as having been affected by the deficient rainfall of that year, it will be seen that the proportion of waste to cropped land was nearly 50 per cent. greater in 1285 than it was five years earlier. What this can mean but that the soils of the district are becoming more exhausted annually it is difficult to surmise.

81. The following figures show the value of the waste and occupied unirrigated Government lands at the dates referred to:—

Year.	Acreage occupied.	Average Rent per Acre.	Acreage left waste.	Average Assessment per Acre.
		A. P.		A. P.
1276 ...	761,781	15 2	335,303	14 7
1281 ...	857,760	14 11	291,219	15 2
1286 ...	829,062	15 0	329,824	16 1

It will be seen that the occupied lands are now of poorer general quality than ten years ago, whilst regarding the waste lands the reverse holds true. What does this show? It may mean something else, but it would lead any one to the supposition that the better lands are going out of cultivation, and that their place has been replaced by large areas of lands of the poorer qualities. The only probable reason why the better lands should go out of cultivation is that they have been over-cropped and no longer produce sufficiently remunerative crops to render their cultivation advisable.

82. That the soils of the district are far less productive than they were twenty or thirty years ago, is the general idea of the older ryots. It was impossible for me to obtain any very definite opinions on this subject owing to the succession of bad seasons which had preceded my tour, but such is the general impression. It is now far more difficult to obtain a fair crop of any product than formerly. And what else could be expected with such a system of cropping as has been shown to obtain in paragraph 11 above? The decrease in the area of land producing pasture or scrub-jungle since the settlement is a matter testified to throughout the district, and deplored universally by the ryots themselves. There is still nevertheless a very large area of Government land lying uncropped. About 320,000 acres of unirrigable land, which has been assessed at a rent of a little over one rupee per acre, is made use of by the ryots without any charge. But I think in the present state of the local agricultural practice it would be unwise to endeavor to induce the ryots to attempt its cultivation. As it is the natural pasture lands have been encroached upon without the ryots having adopted any system of fodder raising. This encroachment should not be extended at present. I think also that it would be advisable to place some check on the taking up of lands by men of no capital, by the simple means of application to the nearest Revenue authority.

83. Why is it that on the Nilgiris, where every inducement should be offered for the extension of coffee and tea cultivation, the Government think it proper to place a price on their waste lands whilst in the plains the ryot has only to apply and he may absorb as much land, and in it State capital, as he can find in his neighborhood? In the latter case it is manifestly the best policy to restrict cultivation to

the narrowest limits, for the greater part of the country is most miserably under-cultivated and generally unmanured.

84. The propriety of a ryot paying for the soil which is, under his management, to be gradually impoverished is recognized in the case of unsurveyed waste; that is on land which has been the cause of no expense to the State up to the time of its being taken up: if however the State has gone to the expense of surveying and assessing the value of any land it may be taken up by any one free of all charges. Surely it would be prudent to place some upset price on all Government lands: perhaps ten years' assessment would suffice to stop the system of taking up, wearing out, and relinquishing land, which is so common, and which is carried on to such an extreme degree in the Udiarpolliem lake. Or perhaps it might be better that every ryot should be obliged to keep a certain proportion of his holding under pasture, and to plant annually a certain area with trees of some sort. Something decidedly should be done to check further encroachment on pasture lands, and on the supplies of fuel.

Reasons for objection to breaking up pasture.

85. The breaking up of pasture lands would be a good sign under certain conditions, and it is a forgetfulness of the necessity for the presence of those conditions which renders so many people oblivious to the pernicious character of the practice in this country in its present state of agricultural development. It is a well-known fact that arable farming marks a degree of civilization, as developed from the original pastoral farming, and as such its extension is commonly looked upon as an improvement. But in every case this is not so. For as live stock are a necessary adjunct to successful arable farming, unless we have a system of spade culture, and a rigorous conservation of all waste substances, so it is necessary that this stock should be provided with adequate supplies of food. As yet in this country fodder raising by arable farming is an unpractised system. The ryot relies on grazing, and on the supply of such straw as he grows in the production of his grain crops; grazing being his chief resource. It is a common source of complaint in nearly every portion of the district that of late years the area of pasture has been so severely trenching upon as to render the pasturing of cattle a more and still more difficult operation. Deficient pasture leads to weak stock, greater mortality from disease, and encourages all the "resistances of life" which stock have to contend with in this country. Miserably understocked as it is, for there are only about 44 head of cattle, and 80 head of sheep for every 100 acres of arable land (making a total equal to about 300 head of sheep) this district has shown no marked increase in the number it supports during recent years, and during the last year, there is every reason to believe that the mortality was extreme, and that the existing stock is far less than that given in the returns for the year (Fasli) 1286.

Effects of deficient pasture.

86. Returning again to the question of the freedom of cropping allowed to the ryots, the decision of the question of course in a great measure depends on the tenure on which he holds the lands he occupies. If the land belongs, as soon as he takes it up, in fee-simple to the ryot, subject only to a tax, then he should be obliged to pay for the soil; if on the other hand the ryot be only a tenant at will, as has been ruled by high authorities, his lease should contain stipulations as to his system of cultivation. But seeing that the Government of India hold the latter view* of the question, surely something should be done without delay to check the present system of exhausting the soil. Even did the land belong to the ryot, and not to Government, it would be just in the interests of the commonwealth to put a stop to unwise and irrational practices, which are from their nature likely at least to impoverish the State. It is clear, I think, that there is no reason, valid or invalid, why the tenants of Government lands should be allowed to do just as they please with the lands let to them; and I believe that there is every reason why they should be confined to

Restriction of cropping required.

* See Sir J. Strachey's Budget Speech, December 1877.

certain definite courses in order to ensure the preservation of State capital—the stores of plant-food in the soil—from their misguided treatment.

87. As proprietors of the soil the State has responsibilities which in European countries fall on the landlords, and such responsibilities should not be lost sight of although the task is so stupendous. What do the landlords of the soil in Europe do? They prevent ignorant or greedy cultivators from exhausting their lands by restricting their cropping, and powers of sale of produce; such a system although liable to abuse has been of the greatest value in checking exhaustion in Europe. They establish societies for the improvement of stock; they offer prizes for the best farming on their estates, and in their neighborhood; they aid in scientific agricultural research; and in fact consult how the cause of their tenants can be best forwarded. They also retain a body of highly trained, able and skilful agriculturists to manage their estates, or to advise on such matters.

The great want for the State lands is officers who have undergone an agricultural training. Our Revenue Inspectors should each and every one be the agricultural oracle and adviser in his own division, as also should the Tahsildars be in their own taluks. To these officers ryots should be able to apply as to men, who, from their fuller knowledge, are able to advise and assist them in times or circumstances of difficulty and doubt. It is true that in the midst of their multifarious duties the Tahsildars cannot have much time to devote specially to agricultural matters; but from the very nature of these duties it must often be in their power to disseminate sound information, if they possess it, and to correct false ideas.

Want of trained land agents for State lands.

88. That an agricultural training for Revenue officers would be a valuable one is the opinion of several officials, native, whom I met in the course of my tour, and several expressed to me a strong desire to be enabled to visit Saidapet and to study there if it could be managed that they should be associated in a short course of training with men of their own standing only. Such a desire it is most advisable to encourage, if it be possible to do so; for there is no knowing what good an energetic Tahsildar might not do, amongst the most advanced and enterprising cultivators with whom he has to deal, if he only knew what to advise. It might be possible to devise a system similar to that lately sanctioned by the Government of India as regards the new Forest School, whereby Forest Rangers are to be allowed to attend the school as long as they make such progress as satisfies the Director, and to receive their full pay whilst studying, subject to a limit of Rupees 150 per mensem. On such terms as these large numbers of the present race of subordinate Revenue officials would doubtless come forward, and it would be possible to inaugurate a special course for their benefit. The training of all future Revenue officials could easily be provided for by demanding from them, before their appointment, a certificate of their having passed through a definite course of study in agriculture successfully.

Demand arising for agricultural information.

89. In the education of the village authorities the Government might also do much by insisting on their possessing an elementary knowledge of the principles of agriculture before they could hold the posts of Munsif, or Kurnam. The cost of their services is enormous, amounting to about 7 per cent. on the rent which they are employed to collect, and something might perhaps be done to obtain more value from an establishment which is surely far more expensive and cumbrous than is necessary. The crowd of collecting officials all feed on the ryots, and their extortions add a real tax on the land. The land itself is most lightly rented, as may be seen by comparing what it pays to Government with that paid by similar land to Zemindars. But it has to bear great burdens, owing to the existence of the present system of collection, the amount of which it is impossible to compute. Such a charge is one which would never be submitted to by a great landlord in Europe; and what results are obtained from such a system? We have a staff of officials who manage the State property ignorant in a great measure of the first principles of agriculture, supervised by a body of

Ignorance of village officials.

men, whose ignorance of the same principles only exceeds that of their subordinates—the village authorities.

90. The cultivation of the unirrigated lands commences as soon as the village astrologer indicates a favorable day; he is, as I have said, consulted in the month of April, but any showers which may fall before the day he names are unutilized; often also on the "happy" day the land is found to be unploughable, owing to the want of moisture; should, however, the soil be in a fit state for tillage the whole of the ploughs in a village are yoked and each cultivator will drive a few turns round his field, when the cattle are unyoked and the work left for the day. The custom of consulting an astrologer is almost universally observed, although amongst the rising generation there are some who neglect this custom, much to the grief of the village elders. If men will sacrifice the best chances of getting their land into proper order at an early date, because of a superstition so unfounded as this, it must take long before they can be induced to adopt new systems in lieu of those which with them are time-honored.

91. In the system of cultivating, little if any difference can be observed on the coarse sandy soils of the south, the sandy loams of the east, or the black clays and loams of the central portion of the district. Some can be ploughed sooner after rain than others, but the practice is the same, no matter what the depth or character of the soil may be. All the work is done by means of the ordinary country scarifier, which, it is almost needless to observe, does not perform the work of a plough. It is said that each yoke of cattle requires two or three new implements annually; the cost of these cannot be set down at less than Rupees 3 to 5, although the actual disbursements are still less. To cultivate the land properly, according to the native idea, one yoke of cattle is required for every 6 or 7 acres. With ploughs of European pattern, one yoke of cattle, superior of course they must be to the ordinary cattle of the country but not much so, will keep under cultivation at least three times that area, at a cost for repairs and interest on the capital invested of not more than Rupees 10 per annum. With the native scarifier the charge per acre is about 12 annas; with an European plough it would not be more than 8. A saving of 33 per cent. would thus be made, or in such a district as Trichinopoly of Rupees 2,50,000 per annum.

92. With the object of endeavoring to introduce to the knowledge of the cultivators an implement which will save them from so much expenditure, I have suggested the exhibition of some European ploughs in various parts of the district during the coming season. The suggestion has met with the approval of the Board of Revenue but has not yet been sanctioned.

93. No cultivation was going on on the unirrigated lands during my tour, so that I am unable to speak from observation regarding the depth attained. If the ryots were to be believed in what they say on this subject, 5 inches is the depth reached; but from what I could learn half that depth is as much as is generally stirred. In one case, in a piece of garden-land, which was scratched to a depth of only about two inches, I was informed that that would suffice. Garden-lands are more deeply ploughed than the ordinary unirrigated fields. Very little reliance is to be placed on the statements of the ryot unless you can bring him face to face with facts.

94. In a few places, on the black cotton soil, I saw a little crowbar cultivation. By this means the soil is turned over to the depth of a foot or more, and the action is most beneficial, as I saw evidence of in one case when I passed through a crop of cotton and castor grown on land which had been dug over the year before. The chief object of the ryots in resorting to crowbar cultivation is to get rid of the Hariali grass, which it enables them to do: otherwise the system is not followed. I did not see five acres of this description of cultivation during my whole tour.

95. Amongst the sayings which make up the agricultural creed of the ryot is one to the effect that, if the soil of unirrigated land be so thoroughly dried, as to cause the loss of half its original weight in a given volume, it is altogether unnecessary to apply manure. It is scarcely needful to point out the error of this saying, although its truth may be apparently confirmed by a short experience. No doubt if a soil be thoroughly pulverised, exposed to the air and tilled, it may, and probably will, produce as good, if not a better crop than a similar soil when manured and tilled in the ordinary way. But, although this may be the case to begin with, the productive power of the soil in the one case is being reduced, and in the other being maintained. The fact that thorough tillage renders a larger supply of plant-food available than imperfect cultivation is well known; but, if a cultivator goes on cropping the land continually without manuring, its stores of nutriment must be decreased, and the end—

exhaustion—is only hastened. It is thus that this saying is misleading, because it may be supported by first experience, and pernicious, because it encourages a practice which it hastens the exhaustion of the soil. It is a self-evident truth that the continuous removal of matter from the soil must exhaust it in the end, although owing to the conditions in which plant-food exists in the soil utter sterility may be deferred for a great length of time.

96. Sowing is always done broadcast, except in the case of the castor crop, the seed of which is generally dropped in lines along the furrow left by a plough and covered up by a second turn. The seed-drill is unknown throughout the district, nor has it ever been heard of. The advantages of drill sowing do not need reference here, but it is a great pity that even the common country bamboo drill, with all its defects, is not in use. Regarding the bamboo drill, it must surely be possible by the use of a wheel and gearing to fit it with a regulating arrangement, which would overcome its greatest defect.

97. Weeding is said by the ryots to be a very costly part of their cultivation. I did not see any weeding going on, excepting in the case of some irrigated crops, and in gardens, during any portion of my tour. I saw no signs of accumulations of weeds gathered from the fields, and in the greater part of the district I saw very few weeds in the land. Weeding must however be carried on to some extent, as the condition of some of the fields of the poorer ryots showed that they did exist. In some places a good deal of Hariali grass (*Cynodon dactylon*) exists in the cultivated fields, but on the whole the unirrigated lands must be said to be very clear of weeds.

98. The harvest of cereals is not commenced by the ryot until the crop is dead ripe, and consequently the straw is of very inferior quality as fodder. The cost of cutting these crops is very great, as only very small tasks are exacted from the laborers. In some places even the ryots did not know how many men were required to reap their fields. Threshing begins as soon as any portion of the crop is brought home, and the whole work is completed as soon as possible; it is generally paid for, if done by manual labor, by a share in the outturn; the cost of this operation amounts to a heavy charge on the produce. The straw is stacked in heaps, circular or oblong, but never before it is threshed.

99. Rotations as understood in Europe, are not followed, but in some places the mixed cropping which is practised in some respects serves the purposes of one. Cereal crops however form the groundwork of all the mixtures, and therefore no true rotation is followed. In one part of the district I found the following systems of cropping to be sometimes followed:—

1st year	{	Raggy	...	...	3 measures.	}	Sown per acre mixed.
		Cumboo	...	...	1 measure.		
		Cholum	...	...	1 do.		
		Castor	...	...	1 do.		
		Cotton	...	...	1 do.		

2nd year	Varagoo	...	...	8 measures.	} Sown per acre mixed.
	Tennai	...	...	1 measure.	
	Mochecottai	...	...	1 do.	
	Caramanai	...	...	1 do.	
	Castor	...	...	1 do.	
3rd do.	Cotton	...	...	1 do.	} Do. do.
	Cholum	...	...	2 measures.	
	Mochecottai	...	...	1 measure.	
	Caramanai	...	...	1 do.	
	Castor	...	...	1 do.	

The cotton plants are never rooted out, where this system is followed, but simply cut down annually and allowed to sprout again. The cereal crops are harvested first, and then the pulses, (*Mochecottai* and *Caramanai*), after which the ground is left to the cotton and castor plants. In the extreme east of the district also, pulses are largely grown either as a second crop after cumboo or mixed with raggy. Dholl also is not infrequently sown in many places, mixed with cholum or cumboo. The system of mixed crops has much to recommend it to the ryot, and is scientifically an advance on the ordinary cropping of the country. It would be interesting to know how many acres of mixed crops are annually sown, but the present returns do not show this. By having a variety of crops the ryot is less entirely at the mercy of the season; for if the season does not suit one crop it probably will another that he has sown. By sowing cotton and castor with a cereal the cost of their production is reduced to a minimum, and their produce becomes a clear gain, as the cereal bears all the expenses on the land up to the time of harvest.

100. Of the cereals grown on this class of lands, Cumboo (*Pennisetum polystachyon*) occupies the largest area, about 164,000 acres; part of this is grown by the aid of irrigation water raised from wells, the variety then sown being quite distinct from that sown on ordinary unirrigated lands. A considerable area is sown with the crop early in the season, and different varieties are sown at various times from June to November. The cultivation of the crop shows no marked features, but it is usually sown by itself, not in a mixture, although this is not always the case.

101. Cholum (*Sorghum vulgare*) occupies about 150,000 acres. The chief variety sown is black cholum, in which the glume adheres to the seed; this variety closely resembles the Chinese sugarcane (*Sorghum saccharatum*), but I saw no young crops, and am unable to tell whether it possesses the sugar-producing qualities of that crop. Yellow cholum is not grown to any extent. In gardens a red-seeded variety is chiefly cultivated, but the white-seeded one is also grown.

102. Varagoo (*Panicum miliaceum*) occupies about 140,000 acres; it is sown on the poorest soils, but is also cultivated on the outlying and unmanured fields in almost every locality. The crop is a very poor one, giving small returns, and producing very little human food. The straw is also very poor forage.

103. Raggy (*Eleusine corocana*) occupies nearly 110,000 acres; it is grown on all descriptions of soil without any difference. A garden variety exists, but no settled custom prevails throughout the district regarding the time best suited for sowing it. In fact most contrary customs are in force in places separated by only a few miles. From what I observed in the case of this crop, and otherwise, I have been led to believe that the ryot's knowledge of the applicability of different crops to varying soils is crude in the extreme. I met with so many instances of contradictory customs as to lead me to a belief that in allotting their crops to the soils they cultivate, our Government tenants are not guided by any knowledge of facts, but by customs often founded without due experience, and carried on until they have become so far "time-honored" as to render their effacement a work of the greatest magnitude, and requiring a long period to elapse before they can be overcome, and replaced by systems founded on a rational conception of the habits of plants and a prolonged and varied experience.

104. The remainder of the area under unirrigated cereals is occupied by samai (*Panicum miliare*), tennai (*Panicum Italicum*), and several minor crops, all of which are but little superior to the uncultivated grasses.

105. Pulses occupy about 80,000 acres; they are chiefly Dholl (*Cajanus Indicus*), Mochecottai (*Lablab vulgaris*), Caramanai (*Dolichos sinensis*), Black and Green-grain (*Phaseolus mungo*), which are generally sown in mixtures with cereals, the three first named early in the season—about July or August—the last two either mixed with a late crop of raggy or alone. The chief area under black and green-grain is in the extreme east of the district. Horsegram (*Dolichos uniflorus*) is also grown to some extent as a catch-crop late in the season, being sown about the month of November.

106. Nearly half the total acreage of coriander (*Coriandrum sativum*) grown in the Presidency is raised in the district, where over 20,000 acres are annually sown. The culture of this crop is only undertaken on the black cotton soils. It is a profitable crop, and one grown for sale. It is generally manured by folding sheep on the land, but receives no special treatment.

107. Chillies (*Capsicum annuum*) are cultivated to a considerable extent on the black soils, without the aid of any irrigation. The crop is manured rather heavily by sheep-folding, but does not demand much special attention.

108. Oil-seeds are raised to the extent of 26,000 acres. The chief varieties grown are castor (*Ricinus communis*), gingelly (*Sesamum orientale*), and ground-nuts (*Arachis hypogaea*) in small plots. Castor is seldom sown by itself, but is usually mixed with cotton, and from what I saw I should think that a good many more acres were under this crop than are returned as being so; but perhaps this may be explained by the way in which the returns are made out.

109. The following statement shows the progress of the cultivation of cotton and indigo, which are generally classified with sugarcane as special products, but wherefore so called, more than gingelly, coriander, or castor, it is difficult to determine:—

Period ending Fasli.	Cotton.		Indigo.	
	Area.	Ratio.	Area.	Ratio.
1276	ACRES. 5,699	100	ACRES. 186	100
1281	23,817	418	851	457.5
1286	59,843	1,050	1,120	602

From these figures it will be seen that the average area cultivated with cotton in the five years ending 1286, Fasli, was more than ten times that cultivated on the average of the three years ending 1276; and though part of the increase is due to the general extension of cultivation, which has taken place, the rest may perhaps be attributed to an increased difficulty found by the ryots in raising sufficient food-grain both for their own food and for sale to meet the demand for rent, owing to a decreased rate of produce.

Cotton being uneatable, must be sold, and therefore is liked by the ryot as a means of raising the money for his rent. I would here draw attention to the fact that in the year 1280 the area sown with cotton was reported as about five times that in the year previous, thus—

	1279.	1280.
Area cultivated with cotton	ACRES. 6,558	ACRES. 35,593

What the cause of this sudden expansion may have been I do not know. The extension went on until the year 1282 when the area under the crop was 74,468 acres; since when it has dropped again to about 50,000 acres.

The total yield per acre is said in the last cotton cultivation report to be about 35 lb. of cleaned lint per acre. I found that the crop is almost always sown in a mixture, very commonly with castor and a cereal, raggy or varagoo, sometimes also a pulse being added. Cotton is not a crop to which the ryot applies manure as a necessity, but the cereal crop, if raggy is not infrequently manured. It is often grown in mixtures, like that which I have mentioned above, for many years together, on the same land. The cost of gathering the cotton is very great; the payment is made by a share in the amount picked; this share varies according to the abundance of cotton to be plucked; sometimes only one-tenth is allowed to the gatherer, at others as much as one-fourth, one-third, and even one-half in the last pickings; probably one-fifth of the produce represents the cost of gathering the crop, that is when it is picked by others than the ryot's family. The ryots look on the crop as an unprofitable one, but as it costs little extra to sow the small quantity of seed they use, and as it brings in a little money net, they adhere to its cultivation. Two well-marked varieties of cotton are cultivated—an annual and a perennial; the former is grown on the best soils, the latter on the poorest. The perennial plant is cut down every year to the ground, after which it throws out new shoots and may go on bearing in this manner for many years. Considering the large area of soil well-suited to its growth, this crop occupies but a small area in the district, although probably the returns are misleading; as they are, I believe, in the case of the castor crop.

110. The cultivation of indigo, as the figures given above show, is very limited. This is to be regretted greatly as the crop is of such great value for restorative purposes; the production of the dye making very small demands on the soil. In the case of this crop also the greatest extent occupied was in the year 1282, since when, until 1286 it has fallen from 2,085 acres to 425; in 1287 there was a slight recovery. This crop is chiefly grown on the unirrigated lands, and only in one portion of the district (in a part of the Trichinopoly Taluk) is it cultivated on the irrigated area, and there only to a very limited extent. It is there taken as a second crop after paddy under occasional irrigation, which is a very good practice. Irrigated land intended for the crop is surface cultivated very thoroughly, but not deeply; this cultivation destroys the weeds, and prepares a good seed-bed. The seed is sown broadcast on the surface, after the field has been flooded. During the growth of the crop it is watered about once in three or four weeks: sometimes owing to the ravages of insects the sowing has to be repeated several times before a good "plant" is obtained.

111. The area of land left uncropped annually by the ryots is very considerable; it is at present about 200,000 acres, or rather more than one-sixth of the total area under the plough. This land may be termed "fallow" in so far as it is left to rest from cropping; but it is never fallowed, as the term is understood in countries where agriculture is a science. Fallowing involves, when properly conducted, a large expenditure of labor, in ploughing and cleaning the land. The ryot never by any chance resorts to any such means for adding to the future productive power of the land he tills: he leaves a portion of his tenancy waste when he finds that it does not yield him sufficiently large crops, to satisfy even him. It being well known that the ryot is content with, and can live upon a crop the meanness of which is astonishing; it therefore follows that, when the productive powers of his land are reduced beyond his satisfaction, the produce must be at a minimum. During the time the land is left waste in this manner it produces weeds, and grass, which supply a certain amount of very poor grazing for the stock of the ryot. The idea of growing a "fallow crop" is not known.

112. The extent of land manured in the district can only be measured by the amount of stock available. The statements of the ryots are unreliable, as I found in numberless instances. Of course the amount of manure used by different men varies considerably, the poorer cultivators using little or none. In the following table I show the number of cattle and sheep which existed in the district at the dates mentioned:—

MANURING.

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	Faali.	Cattle.	Sheep.	Total Live-stock reduced to Sheep.
1271	...	366,172	656,225	2,487,085
1276	...	382,289	656,962	2,568,407
1281	...	376,718	622,280	2,505,870
1286	...	424,093	768,747	2,889,212

From these figures it will be seen that in the five years ending 1281 there was a loss of 6 per cent. on the manuring power; but that in the ten years ending 1286 there was a gain of 8 per cent. How can this fluctuation be accounted for? There was an increase of nearly 50,000 cattle, and nearly 150,000 sheep in five years, some of which were far from being favorable ones to the health of stock.

113. The following figures show the ratio of increase in the stock and area of occupation:—

	1271.	1276.	1281.	1286.
Ratio of manuring power	97	100	97.5	112.5
Do. of area under plough	76	100	112	109
Stock as sheep per 100 acres under the plough.	370	289	252	299

The great change in the area returned as being under the plough in 1271 and 1276, is due to the new survey, so that the figures for the former year cannot be fairly compared with those of the latter.

114. There are probably in the district about 50,000 acres of land manured annually at a rate equal to that supplied by 5,000 sheep penned for one night on an acre. The remainder of the manure is distributed in different amounts. An average rate of manuring is perhaps 3,600 sheep a night per acre. At this rate it would take the present stock twelve nights to manure 1 acre in each 100 acres cultivated. It is possible to manure usefully during about nine months of the year, so that with the force he possesses the ryot might manure at least 20 per cent. of his holding per annum. In reality however the greater portion of the cattle manure is wasted, what is accumulated is poor, sun-dried, and weather-beaten.

115. Taking the sheep by themselves it may be possible that 5 per cent. of the occupied area is manured by them, but that would scarcely be more than the land irrigated from wells and water-lifts. Sheep manure, however, does not go to that class of land exclusively. What cattle manure the ryot has he prefers to apply it to his garden lands, making up the deficiencies by sheep-folding, and penning his sheep on his unirrigated lands when he has no further use for them in his gardens.

116. According to the general estimate of the ryots, where they preserve all the dung of their cattle for manure, two cart-loads per annum is as much as they can count upon. The practice of preserving cattle dung is far from being universally followed. You see heaps of this manure outside the villages in most parts of the district, but their size varies greatly, generally proportionately to the abundance of wood-fuel

in the neighborhood. In the valley villages you scarcely ever see such heaps. This manure is simply thrown down outside the village-site, a slight excavation being made generally, but no steps are ever taken to preserve it from the influences of the atmosphere. Together with the cattle dung, household sweepings, ashes, &c., are mixed. The urine of the cattle is totally wasted, the ryots not seeming to appreciate its value; as this is the most valuable portion of the excrements of the ox the loss is very great.

117. Cattle are sometimes penned in the fields for the sake of their manure, in the same way as sheep, but this is by no means a very common practice. In some places the people are so afraid of thieves that they do not dare to leave their cattle outside their houses at night.

118. A good dressing of cattle manure is said by the ryots to be about 30 to 40 loads; usually however it is very seldom that more than 10 or 15 are applied. Estimating that the manure of 300,000 head of cattle in the district are made use of, the area that could be manured by it is about 20,000 acres only.

119. If the ryots adopted the box system of keeping their cattle, they would obtain *ten times* as much manure per annum from them. As the price of cattle manure is about 6 to 8 annas per load, the value of the larger supply would be about Rupees 12 per annum per pair of cattle kept. With such supplies of manure the produce of their lands would soon increase, and the large additions of organic matter to the soil would render it far less liable to the effects of drought.

120. Besides sheep-folding, and applying the cattle dung and sweepings referred to, the ryot only uses alluvial earth, excavated from the bottoms of tanks, &c., as manure; excepting on the irrigated lands where leaves are used for the paddy crop. Oil-cake is seldom used, and then only in the valley paddy-fields. The use of bones as a manure is unknown: similarly with lime. Saltpetre even is not valued; in some places where I suggested its use for the tobacco crop, several ryots told me that they would try some in the next season.

121. The amount of leaves used on the whole can be but small, as the supplies are very limited. In the Cauvery valley a very small portion of the area is manured by leaves; the paddy lands in this locality occupy 80,000 acres. Of the remaining 50,000 acres, a very considerable proportion goes without leaves. Very few trees are to be seen which produce leaves fit for the purpose of manuring paddy land; and the amount of shrubs, &c., available is also very limited.

PASTURE AND LIVE-STOCK.

122. It is, as I have already noted, a matter of general complaint amongst the ryots that their pasture lands have been much diminished in area of late years. This is supported by the evidence of the increased area brought under the plough, which I have already given. The ryots however do not see that it is their own duty to raise pasturage, or forage for their own stock in some way or other. They look upon the State lands as their own property as far as grazing is concerned. The sooner this idea is got rid of, the sooner will fodder raising become a part of the native system of farming. At present the ryot does nothing to try to improve natural pasturage, nor to lay down grasses for the growth of fodder. The idea of manuring pasture lands is too much for even his stolidity to resist. I suggested the possibility of doing such a thing to some, but evidently the ryots thought I was talking very wildly. To sow grass-seeds is beyond the ryot's comprehension. In fact he knows nothing at all about the management of pasture lands, a matter requiring great skill and care in the most favored climates.

123. During my whole tour I saw no good pasturage. I saw many thousand acres of waste lands, which had never been broken by the plough, but of the evidences of a good sward of grass I observed none, excepting in some few small patches near the courses of some streams.

124. The area still supplying pasturage is considerable, but it is, as the ryots asseverate, not sufficient in many places, I believe, under their present system of management, for the grazing of the stock of the district. Already the ryots complain that, owing to the want of proper forage, their cattle are getting weaker. Any further diminution of the grazing area should be opposed in the present state of the farming of the country. When the ryots have learnt the art of pasture-farming, it will be time to extend the area under the plough. The land devoted to pasture is, according to the assessment of it, of better quality than that which is cultivated.

125. The cattle of the district are nearly all of the common small, black, white and red breed common in this part of India. Their live weight is probably not over 350 lb. No great number are bred in the district, but every village raises a number of calves annually. The valley villages, and Tanjore draw a considerable number of working cattle annually from the unirrigated portions of the district. In the valley villages, the cattle only last a very short time; the severe labor, whilst badly fed, entailed on them in drawing the native plough, which owing to its defective construction is of very heavy draught, soon wears them out, when they are replaced by fresh purchases from the upland villages.

126. The cows of this district seldom calve until they are 5 or 6 years old, and then only drop a calf once in eighteen or twenty-four months afterwards. There are however to be found in most villages some few cows which reach maturity at an earlier date, and which are far more prolific. The ryots have no idea of the effects of using good bulls in improving their stock; and when I suggested that the progeny of cows of a more prolific character would probably possess the same character, and be able to impress it in some degree on their own offspring, the idea seemed quite new, but still it did not seem to be thought worth trying. The ryot appears to be very apathetic as respects his stock. But whilst apathy is the ruling characteristic regarding the selection of the sire, a most peculiar superstition prevails regarding the birth-day of the calf. Should a cow happen to calve on a Sunday, or should a buffalo calve on a Friday, it is said that, unless that cow or buffalo be immediately sold out of the herd to which it has belonged, the whole herd will suffer, even if it be not dead before the expiration of a twelvemonth.

127. The yield of milk obtained from cows is extremely small, $1\frac{1}{2}$ to 2 pints being considered a good daily yield. In purchasing or selling cows their prices are regulated almost solely by their milk-producing powers. Cows as a rule are not used in any of the works of farming, but in one portion of the district I found that the people of a Christian village were in the habit of working them regularly. In another place I found cows used by Hindoos, the reason for it being explained by the fact that they had not sufficient working cattle. The buffaloe cows are used for tillage in some places, but not regularly. These facts all go to show that there is a great waste of power in the neglect of the ryots in using their cows for draught purposes.

128. Cows never receive as much attention, unless they be milking, as the tilling cattle. The latter get the straw in a time of scarcity, as the ryot does not look beyond the immediate future. The short-sightedness of this policy is manifest.

129. Two breeds of sheep are to be found in the district. The ordinary red hairy variety, and a black woolled description. The latter is only to be found in any number in the country around the base of the Puthamullays. The sheep pick up their living as best they may on the waste lands and in the stubbles. They are driven out to graze by day, and penned on the land at night. They are exposed to the sun and weather, and no food is ever raised for them. They receive no sort of food besides the scanty coarse herbage they meet with in the fields. Their manure must consequently be of very poor quality. They do not weigh above 30 lb. live weight as a rule.

130. The chief lambing season is generally about the months of November and December, but chance lambs are dropped at all times of the year. No care is taken to separate the sexes at other times than when it is necessary for the rams to be with the ewes, and the flock generally consists of sheep of all ages, so that too early breeding is never checked. If a ewe happens to bear two lambs it is considered to be as fatal to the flock to keep her in it, as it would be to a herd of cattle to keep a cow which calved on a Sunday. In neither of these cases does the fatality extend to the flock or herd of the purchaser of the cow or ewe; it only affects that in which the animal was at the time of the birth of its offspring.

The red hairy sheep are said to produce better mutton than the black woolled variety, but as the former is only useful as a manure-cart, and as a provider of food, it is extraordinary that a cross between the two should not have been attempted. In some places the ryots informed me that they had tried the woolly sheep, but that they had not done well; what sheep they had purchased having died off in a short time; but I was unable to ascertain any definite reason for the want of success in these endeavors. In this case, as in many others, the ryots' inability to give an intelligent reason for what they do and leave undone was well shown. I fancy that probably the change of herbage may have been too much for the sheep, as they are not in any way particularly cared for. The effects of a single adverse season also may have had much to do with the loss incurred. I do not think that there is any reason to believe that the differences of soil are matters which, under careful management, could not be got over. I saw in one place both varieties of sheep doing well on the same description of soil; this I think proves that by attempts properly directed a woolly breed of sheep might be kept in most parts of the district. The advantages of possessing a sheep which both produces wool, manure, and mutton, instead of only the last two, are self-evident.

131. If Government were desirous of attempting to breed sheep and cattle on a scale sufficiently large to be able to distribute bulls and rams throughout the country, there are several places in the Trichinopoly District which would provide good sites for breeding farms. I saw one spot, about 40 miles east of Trichinopoly in the Udiarpolliem Taluk, where there is a large area of waste land, at present covered by a scanty scrub-jungle, which I think would form a good location of such an establishment. In the Perambalur Taluk also places well suited for a grazing farm could be found.

132. If it be desired to improve the cattle stock of the country some check should be put on the indiscriminate use of bulls. The ryot himself attaches no importance to the description of sire that serves his cows, and it is therefore at present hopeless to attempt anything by the simple distribution of good bulls amongst the agricultural population. Such bulls would be lost; their value would be unappreciated; their services unutilized; and in fact the money spent in rearing and distributing them thrown away. Some such system as that suggested in my report on the Saidapet Experimental Farm for last year, of allowing the use of only licensed sires might be easily worked, and, if all licensed bulls had to be branded in some conspicuous part, could not be easily evaded. The necessity for improving our cattle stock is a matter of general acceptance.

133. Although I believe the returns of live-stock to be sufficiently of a uniform inaccuracy to be useful for the sake of comparison, there can be little doubt that as statistics they are full of errors. Many of the village Kurnams send in their returns, made up at a guess: these figures are tabulated and added up in the Taluk Offices, where error is piled upon error, without any means of check being adopted, and then sent to the District Cutcherry, where the errors of the different taluks are again added together, and the result sent to the Board of Revenue. Although it is almost impossible that check by actual enumeration could be carried out at present, yet a comparison of the returns of each successive period, would prevent many gross errors. The

following figures which show the return of live-stock for the Kulitalaj Taluk for the years referred to, bear on them an impression of incorrectness, which would surely strike any one on examining them:—

Year of Return—Fest.	Tilling Cattle.	Cows.	She-buffaloes.	Sheep.	Total.
1276	29,941	34,431	7,294	85,352	157,018
1281	29,940	34,430	7,294	85,350	157,014

A moment's thought will show how improbable it is that the stock of a large area, and of such numbers should remain practically stationary during a period of five years. It is of course possible that such a return may be correct, but a strong cause for doubt is raised by the fact that the number of stock in every class presents no material change; the number of she-buffaloes being exactly the same at the different dates.

134. In the following table I show a few of the live-stock returns made by the Kurnams of the villages to which they refer, a glance at which will show how probable it is that the figures given are incorrect in many cases, although it is possible that they may not be so. The probability however is so great that it will be safe to say that these returns are utterly unreliable:—

Villages.	Years of Return.	Tilling Cattle.	Cows.	She-buffaloes.	Bulls.	Sheep.
Sottikulam	1276	281	253	169	...	2,647
	1281	301	350	180	...	2,618
	1286	416	550	200	4	2,600
Sattaramanai	1276	148	169	110	...	1,600
	1281	140	160	105	...	1,500
	1286	332	395	185	...	1,550
Kalinganaiyannallur	1276	94	35	22	...	250
	1281	78	19	10	...	150
	1286	55	75	20	...	350
Arumbavur	1276	594	615	175	24	2,470
	1281	440	500	189	14	3,730
	1286	728	901	111	11	4,676
Veyrantattai	1276	500	900	200	20	1,620
	1281	600	850	150	15	1,615
	1286	580	620	180	...	1,380
Valikondapuram	1276	264	236	68	13	1,359
	1281	150	30	16	...	302
	1286	166	188	55	...	1,056
Jeyankondaaholapuram	1276	557	577	348	153	851
	1281	202	138	84	19	206
	1286	318	710	90	...	700
Nerikomodu	1276	20	19	7	4	70
	1281	20	25	7	4	100
	1286	20	20	10	4	100
Kannudiampatti	1276	844	1,212	97	...	4,211
	1281	854	1,245	112	15	4,235
	1286	670	523	45	...	1,511
Tirambaliar	1276	801	322	66	59	1,246
	1281	269	561	35	126	1,015
	1286	300	183	46	54	1,605

Village.	Years of Return.	Tilling Cattle.	Cows.	She-buffaloes.	Bulls.	Sheep.
Mahendrapuram	1276	1,076	883	323	177	2,945
	1281	1,076	883	323	177	2,945
	1286	1,076	883	323	177	2,945
Kattalai	1276	583	417	133	80	580
	1281	520	380	120	70	520
	1286	229	220	56	...	522
Ranganadapuram	1276	345	260	20	23	380
	1281	280	250	50	20	300
	1286	100	300	30	15	430
Padiripatti	1276	202	303	69	...	680
	1281	368	806	125	26	2,000
	1286	140	107	42	...	691
Porundalur	1276	290	500	20	...	800
	1281	290	500	20	...	800
	1286	370	940	234	...	4,895

135. Unless these returns are fairly accurate they must be misleading. To ensure a greater degree of correctness would not cause much expense, if all the village returns were examined and tabulated in one office in the same manner as the census returns were.

136. In the following table, I show the number of deaths of sheep and cattle registered during the past few years:—

Fasli.	Cattle.		Sheep.	
	Number.	Deaths.	Number.	Deaths.
1281	376,718	...	622,280	...
1282	...	...	...	...
1283	...	2,011	...	12,173
1284	...	4,776	...	14,636
1285	...	4,765	...	22,972
1286	424,093	5,111	768,747	29,012
1287	...	6,834	...	117,460

These figures are taken from the Administration Report, and I am not certain whether they are supposed to represent the total number of deaths, as the context would lead one to suppose, or the deaths from disease as the number inclines me to think. If the former be the case they are, as respects cattle, utterly absurd. The average number of cattle in the district is about 400,000 head; the deaths averaged in the three years ending 1286 nearly 4,900, or at the rate of 1.2 per cent.; this would show that the length of life of the cattle averages 83 years—a manifest absurdity. If the latter be correct the losses from disease have not of late years reached any serious figure. From what the ryots told me the recent losses by death must have amounted to a very serious percentage on the total number of cattle. The number of sheep which died annually in the three years ending 1286 amounts to about 3.2 per cent. of the total stock, showing, if the total mortality be registered, the average life of the sheep to be 31 years; if the deaths are only those from disease, which were nearly 16 per cent. during 1287, they were terrible. The great loss is explained by a want of food and water, so that it may be concluded that the deaths referred to are supposed to represent the total mortality.

THE LABORER.

137. Throughout almost the entire district farm laborers are paid in kind. They receive a certain monthly allowance of grain, a small share of the produce for harvesting and threshing the crop and sundry special allowances. The latter are often as follows:—

One or two cloths,
A pair of sandals,
A blanket,

} annually.

And advances on the occasion of a marriage to the amount of Rupees 10 to 15, and a few annas for each burial. The advances are always kept unsettled as a

Slavery of Laborers. means of retaining the services of the cooly. If the latter wishes to change his service he must repay the debt; the amount of this debt he is of course unable to check. By means of this system the employer is able to keep his laborers in a state of practical serfdom. Advances made to the father of a family are carried on to the son if he dies, and so the system is perpetuated from generation to generation. The condition of these laborers is deplorable, but it is difficult to see how it can be altered.

THE RYOT.

138. Most of the Government tenants are men unable to read or write, and often men who have never been further than the nearest market during the whole course of their lives. The ryot's system of farming is of course the result of long experience, but from his extremely unassimilative nature for demonstrated facts this experience cannot carry great weight. The simple fact of its having been handed down unchanged for many hundreds of years clearly shows how little he is given to attempting anything beyond what his father did before him. In fact it is easy to imagine that Hindoo farming resembles the first attempts of man in the cultivation of the soil.

139. As regards his customs, the practices of the ryot are extremely local, and the differences between the systems, if they may be called such, of different localities are very small. These differences I believe not to be founded on an appreciation of the variation of the circumstances of the different cases, but altogether on chance. To give an explanation, intelligently, for his customs is beyond the capacity of the ryot, in fact very few of their practices on which they insist can be explained. The fact that their customs are time-honored does not at all prove that they have anything to recommend them. What would our condition be if this idea had been accepted in England? There is a proverb amongst the ryots that if one of them were to calculate the cost of his agricultural operations, he would not even find that he had one goad left by way of profit. This I think may

Small profits of the ryot. be taken to show how wretchedly poor are the returns from farming as pursued by him; although no doubt it might be explained that he is unable to make a calculation of the cost of it. But it must be evident that did his returns yield him a handsome profit the fact thereof would be easy of demonstration by one even so illiterate as the ordinary ryot is. The profits of farming the ordinary unirrigated lands of the district—and it is of them only that one can speak as they occupy the greater part of the cultivated area—are so very small as almost to preclude any chance of the ryot's adopting much in the way of improved agriculture. The capital invested in the land by the ryot is very little; besides his stock he has scarcely any, excepting the power of working, a great deal of which he wastes, as he is idle for a considerable portion of the year. He might do much to improve his holding, but he does little.

140. To be able to influence the ryot, and to induce him to adopt new practices, &c., is a matter almost impossible of accomplishment. The present race of cultivators will scarcely be affected by any means that can be devised. Perhaps the only manner in which they could be affected would be by the employment of itinerant

teachers, who might travel amongst them, and whilst pointing out their mistakes show them the remedy. In this way some good might be done. The class however which may be taught the true principles of husbandry, which are the same all over the world, is the youth of the rising generation. General education however is much required and it must be extended, before the only means which has of late years been found to be of any great value in diffusing sound information regarding the science of agriculture—agricultural education—can be hoped to produce very marked results. There are however already plenty of educated natives of all classes to whom the advantages of an agricultural training should not be denied. The ryot, I fear, will adopt but little from any model the State may put before him. Even amongst a far better educated, and more intelligent and energetic class of farmers in England little value is set on a model farm. In that country, model farms have done little to advance its agriculture, although the experiments conducted by large landed proprietors have had a marked effect.

SAIDAPET,
29th March 1879.

(Signed) CHARLES BENSON, M.R.A.C.,
Asst. Supt. of Govt. Farms, Madras.

