

EAST INDIA (COIMBATORE)

COPY
OF
MR. ROBERTSON'S REPORT
OF THE
TOUR IN COIMBATORE

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EAST INDIA (COIMBATORE).

RETURN to an Address of the Honourable The House of Commons,
dated 5 April 1878 ;—for,

COPY

OF
MR. ROBERTSON'S REPORT

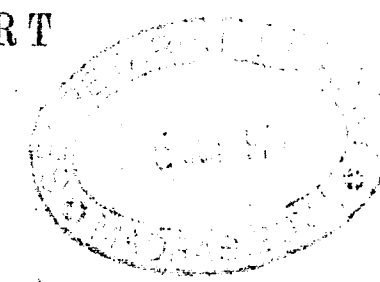
HIS
TOUR IN COIMBATORE.

(Sir George Balfour.)

M. R. ROBERTSON'S REPORT

OF HIS

TOUR IN COIMBATORE.



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1. IN Government Order, No. 1,550, dated the 1st November 1875, I directed to undertake a tour through the Coimbatore District, in view of collecting information regarding its agriculture.

THE COIMBATORE DISTRICT.

AREA, AGRICULTURAL HOLDINGS, POPULATION, &c.

2. The area of the district is 7,432 square miles, of which 1,298 square miles consist of Government Forests, hill tracts, waste land and permanently assessed properties; the remainder, 6,134 square miles, or 3,925,760 acres, is Government land under ryotwary tenure, but of this rent is paid only for 2,200,000 acres, leaving 1,725,760 acres of ryotwary land, from which no revenue has ever been derived.

3. The occupied area is held under 215,207 ryotwary leases, as below:—

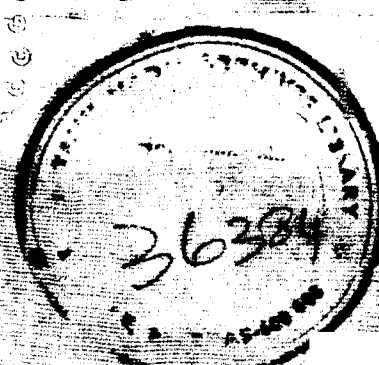
RENT.	In 1871-72.	
	Number of Leases.	Total Amount.
		Rs.
Below 10 rupees	142,455	7,07,299
From 10 rupees to 30 rupees	57,138	9,00,995
" 30 " " 50 "	9,602	3,49,968
" 50 " " 100 "	4,628	2,97,774
" 100 " " 250 "	1,199	1,66,558
" 250 " " 500 "	152	48,340
" 500 " " 1,000 "	26	18,119
Above 1,000 rupees	7	11,182
TOTAL	215,207	24,90,335

From the foregoing it would appear that the average rent of a holding is about 11½ rupees per annum; as the average rent over the whole district is about 15 annas per acre, one of these holdings will be about 12 acres in extent. It will be seen that there are a considerable number of good-sized holdings, thus:—

- 9,602 holdings, each of an area between 30 and 50 acres.
- 4,628 holdings, each of an area between 50 and 100 acres.
- 1,199 holdings, each of an area between 100 and 250 acres.
- 152 holdings, each of an area from 250 to 500 acres.
- 33 holdings, each above 500 acres in extent.

4. It is true that in some instances a holding may be held in a joint tenancy by two or more persons, but on the other hand several of the smaller holdings may be held by one person.

5. At the last census in 1871, the population of the district was 237·3 per square mile, consisting as follows:—Hill tracts, 1·7; others, 12·067; others, 100. Of



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are only 595 in the whole district. Of the entire population were classed as agriculturists. Of the 537,000 males entered lists, 256,130 were cultivators, and 138,679 were labourers. Fourths were employed in connection with land. It will be seen that there were about 40,000 more persons classed as cultivators than there were as labourers; it is probable that many of these are tenants on the Z. Inam lands, and sub-tenants holding land under other ryots on the same. The population of the district in 1851-52 was 1,153,862, but this was about 20,000 persons who inhabited the Neilgherry Hills; deducting the population of Coimbatore was in 1851-52, 1,133,862; the increase in the population in the last 20 years was thus 629,412 persons, or 55½ per cent.

ROUTE; METHOD OF CONDUCTING THE INQUIRY, &c.

6. I began the tour at Pothanore on the morning of Thursday the 13th of January. From Pothanore I passed on to the town of Coimbatore, where I remained for some time. During the halt I was employed in inspecting the land in the vicinity, watered by wells and by the Noyel River, the Gaol Farm, the Municipal Gardens, &c. &c. On the 27th I left Coimbatore for Mettapollium on my way, I stopped at Goodaloor, from the evening of the 27th to the morning of the 1st of February, and visited several of the neighbouring villages, among others, Coundenpollium and Naickenpollium. I reached Mettapollium on the 1st of February, and remained there until the 7th, engaged in inspecting the neighbouring country and the land on the banks of the Bhowany, both to the east and west of Mettapollium; I also, at the same time, inspected the coffee estates situated at the foot of the Coonoor Ghaut, and the cultivated land in the vicinity. From Mettapollium I passed on to Annur, which place I reached on the 8th. During the two days I was at Annur, I visited Vadakaloor, Mettapollium, and Mettapollium. On the 11th I reached Avenashy, where I camped until the 18th. While at Avenashy I inspected the cultivated land in its vicinity, and made several short tours. On the 18th I started for Sattiamangalam Taluq. After seeing the cultivated land in the neighbourhood of Sattiamangalam, and visiting several villages situated within a few miles, I left that place on the 22nd for the town of Bhowany. On my way to Bhowany, I camped for a short time at Gopichettypollium. I remained at Bhowany until the 2nd of March, and inspected the wet land situated on the banks of the river, as well as the land watered by the Bhowany Channel, and visited several villages to which only "dry" land is attached. On the 2nd of March I started for Caroor, camping at Chavadypollium, Malayampollium, and near the Noyel River on my way; as this route followed very closely the Calingaroyen Channel, I had ample opportunities of seeing the cultivation dependent on it. I reached Caroor on the 4th of March, and while there inspected the land watered by the Cauvery Channel, and by the Ambravutty, and visited Nerur, Andankovil, Punjamathavy, and other places. On the 11th of March I left Caroor for Kongiem, and camped on the way at Paramathy and at Vellakovil. From Kongiem I visited Koundenpollium, Papireddypollium, Siven Malai, and some other villages. On the 17th I left Kongiem for Darapuram, and halted at Oothoor. When at Darapuram I visited Colinjivady, Nilambur, Nunjam-pollium, Alengiam, Condrasanpollium, Punjaputty, Ooppar, Varapollium, &c., and gave much time to an inspection of the land watered by the Ambravutty. On the 28th I started for Oodumulpett; on the way I halted at Thalavoypat-tanam, at Karathoolavoo, and at Thoongary. From Oodumulpett I visited Bodipatti, Chinnaveerumpatti, and some other villages. On the 31st I left Oodumulpett for Pollachy, and halted at Gomungalam and at Thippuzampatti. When at Pollachy I visited Vadugapollium, Auliar, Palaur, Cotampatti, and other villages. I left Pollachy on the 5th of April for Pothanore, and stopped at Coundenpollium, at Kanathocadavoo, and at Othikkalmundapum; at the latter place I inspected a site for the District Experimental Farm. While at Kanathocadavoo I inspected another site which had been selected by the Collector. On the 11th of April I returned to my home.

It is seen that I made almost an entire circuit of the district. The Taluqs excepting Collegal, which I found it impossible to visit, were all visited. Delaying my tour in the southern and more important parts of the district was too late in the season. Though unable to visit Collegal I met the Amildar of the Taluq, who favoured me with much valuable information regarding its agriculture.

The whole of my travelling was performed during the winter season, so that I was enabled to see the country, and inspect everything of interest. I usually camped for a few days in places that appeared suited as centres, from which to inspect the neighbouring land, and from these I made short tours into the surrounding country. The distance apart of these observation centres varied from 5 to 30 miles. I usually visited the ryots at their villages; the inspection of the land belonging to these villages was performed in company with as many of the ryots as chose to accompany me. During such inspections various topics were discussed, bearing on the condition of the country around, the agricultural practice of the locality, &c. In some places the ryots came in large numbers. I did not trust alone to the information I collected at the ryots' gatherings, but availed myself of the frequent opportunities afforded while passing through the country, of picking up facts from the ryots whom I found engaged in the fields.

GENERAL APPEARANCE AND STATE OF THE COUNTRY.

9. Around the principal towns the country is usually well wooded, and all the chief roads are bordered by trees, but throughout the district generally the landscape is exceedingly bare. In some places the rich growth of vegetation on the land irrigated by rivers and wells forms a redeeming feature in the landscape; however, the amount of land under the influences of irrigation is but an exceedingly small proportion of the whole area. I was surprised to find that the banks of the chief rivers almost without trees. The Bhowany, a few miles above Mettapollium, has some fine trees growing near it, but these are confined chiefly to the lower portions of the valley; the higher slopes are generally covered only with low-growing bushes, chiefly acacias; further down between Sattiamangalam and the town of Bhowany the banks of the river are almost bare; the banks of the Ambravutty, of the Noyel, and of the Cauvery are equally destitute of trees. Most of the large jungle streams have on their banks narrow fringes of scrub jungle, but it is rare indeed that any good trees are met with in such situations. I saw but little natural forest during my tour, excepting that growing on the slopes of the Annamalai and the Neilgherry ranges. Of dense jungle, I also saw but little; I passed through several of the so-called jungles, but they are so exceedingly open a horseman could ride through them in almost any direction. These jungles consisted chiefly of acacia bushes scattered apart at wide intervals over the ground; the undergrowth is apparently kept in check by the cattle and goats of the ryots living in the neighbourhood; of pasturage there is but little in these jungles, the grasses chiefly met with being coarse reedy varieties, useless as fodder, except when quite young. These jungles would undoubtedly have been cleared long ago had the land possessed any value. A much worse description of jungle, and one which occupies far too extensive an area in this district, is that formed of the prickly pear. In some places energetic measures appear to have been taken to annihilate this pest, but there are still larger areas of land covered by it. Much good agricultural land has been rendered temporarily useless from having been taken possession of by the prickly pear. Ryots have done much to spread this troublesome pest by using it in so many instances for fencing purposes. In some parts of the district the fields are divided by belts of prickly pear some- times of many yards in width. It has been denied that the ryots ever plant the prickly pear for fencing purposes, but I saw during my tour many new-ly-formed fences, and others in all stages of growth. Again and again I pointed out to the ryots the serious mistake they were making in allowing so much useful land to remain covered by this pernicious plant, but they seemed not to recognize the evil that arose therefrom, though when advised to plant trees for the supply of fuel for their own use, they invariably expressed their

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They would be to do so, could they but obtain the necessary fuel they ever could require for their ordinary domestic use. The overgrowth of prickly-pear is not confined to agricultural land, much of the waste land within and bordering many of the villages under such circumstances it cannot but be highly pernicious, especially as the ground under prickly-pear is in such situations the property of the village. In some places the ryots excused themselves for having belts of prickly-pear around their fields, on the ground that they would be permitted to remove these belts as they formed demarcation lines, or boundaries, but I have reason to believe that, if the ryots were really in earnest in a desire to get rid of the prickly-pear, they would experience no difficulty in doing so. I was sorry to observe in many parts of the district that those entrusted with the management of the roads are blameable to a great extent for the extension of the prickly-pear nuisance. On some of the roads for miles on either side, at intervals of from 10 to 30 yards, I saw pits which had been dug in excavating road gravel which are now full of luxuriant prickly-pear. Many of these pits being situated so close together, the intervening land cannot be tilled, and this in time becomes covered with prickly-pear by the spreading of the plants growing in the pits. It seems a great pity to have agricultural land disfigured and injured by these gravel pits; to many of these roads margin drains would be of great service for carrying off water after heavy rain, and there would be no practical difficulty, in most instances, in obtaining the material needed for road repairs by cutting these drains, as the material appears to be met with generally very near the surface.

10. The general absence of plantations of fruit or fuel trees, and the almost complete absence of trees in the ordinary villages, shows how very unenterprising are the people. Of the occupied area, 2,200,000 acres, there are only 5,000 acres under plantations of this sort. It is true that the climate of Coimbatore is not particularly favourable to the growth of trees, but there are no difficulties to be encountered that cannot be overcome by the expenditure of a little labour, which it would be in the power of most ryots to afford, seeing that it would be chiefly demanded of them at the season of the year when they have but little work to do in their fields. Near the towns of Coimbatore, Darapuram, Bhowany, Caroor, and one or two others, there are many trees of very large growth; the mango trees, especially at Bhowany and Darapuram, were very fine. The production of trees over the district is, I think, essential to the well being of its agriculture.

11. As a beginning in tree planting, Government might establish a number of camping topes in different parts of the district; such topes should be situated at about 10 miles apart along the principal roads, and each should be provided with a well. These topes would afford hints to the ryots in tree planting, and, if placed under the charge of the officers of the village to which the land was attached, the expense of maintenance would be trifling; the topes would be remunerative in time, in the fruit rent, from the proceeds obtained for fuel, and the camping fees. In many parts of the district there are no public bungalows, and in other parts the public bungalows have been rented for private occupation. I found tent-life almost unendurable in the months of March and April, when the tents had to be pitched in open ground exposed to the full glare of the sun. In some places I had no choice but to pitch my tents on the roadsides, in order to secure such shade as the roadside trees afforded.

12. It is generally asserted by the ryots that during the past 30 years an immense area of land, which was covered with trees and bushes of a luxuriant growth, has been cleared, partly in view to the extension of arable culture, and partly to afford fuel for the railways, and to meet the largely increased domestic demand. I was shown large tracts of country, which the people declared was formerly jungle only 20 or 30 years ago.

13. It is certainly the fact that upwards of 700,000 acres of land, which was growing jungle and coarse grass, has during the past 18 years only been brought under the plough, and this must have influenced the climate of the district, seeing that the land thus brought into cultivation is perfectly bare during two-thirds of the year. The people were unanimous in stating that the rainfall

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has gradually diminishing during the last 20 or 25 years; they are inclined to connect this diminution in the rainfall with the denudation of the country, though this was the case only in occasional instances. I have brought forward of the smaller rainfall during the last few years in comparison with that of the earlier part of the period before mentioned chiefly of facts relating to the flow of certain rivers and streams. I was told that the streams, which now cease flowing invariably before the end of December, 20 or 30 years ago were said to have flowed regularly to the end of January. This matter, I think, demands the serious attention of those interested in the welfare of the country.

14. I am aware that it is asserted that the rain registrations made during a great number of years in this Presidency show no perceptible diminution in the rainfall, but, if this is the case, it must be remembered that these rain registrations have been made for a long period only at a very few places; that, lately, the rain gauges used were imperfect, and the observers untrained, and that the localities in which these registrations were made were generally well wooded, being in the most instances the head-quarters of a district. Rain registrations made in a well-wooded part of a district are not likely to show the effect produced by the denudation of another portion 20 or 30 miles distant. It is well known how greatly the fall of rain is influenced by local conditions. At Sydapet, the rainfall differs from that registered at the Madras Observatory, though the distance between the two places is only five miles.

15. On most occasions when I met an assembly of ryots I directed attention to the great importance of tree planting, in view to the production of fruit and of fuel, the improvement of the climate, and the protection of live stock by affording shelter during severe weather, &c. But though the people generally agreed with me in the views I expressed, they evinced but little desire to carry them into effect. In one place, after addressing a large assembly of ryots under the shade of a tree, I was informed by a ryot, and the rest appeared to agree with him, that trees would not grow in that locality; I immediately asked what had caused the tree to grow under which we were then standing, and they replied that "it had come by itself;" as the tree was bearing seed at the time, I advised them to collect the seed and to plant it with due care, under the necessary conditions to ensure germination, but they protested that it would be quite useless to sow the seed, for "the tree only came by itself."

16. I am convinced that if proper means were taken there would be no difficulty whatever in clothing with trees the greater part of the district where trees are needed, but to produce this result the ryots living in these places must be distinctly informed that they must plant and rear a certain number of trees for each acre of land under occupation, or that the State will plant and rear the trees at the expense of the ryot. If the State is bound to support the ryots during famine seasons, it certainly has a right to expect that he will take such precautions as are in his power to make these famine seasons as less frequent as possible. On two or three occasions, when discussing this question at ryot gatherings, the people said that if Government ordered them to plant and rear trees they would do so. It would, I think, be doing a kindness to the people to compel them to plant a certain number of trees on all their holdings where trees are needed, the trees, of course, to be the property of the people who plant and rear them, but restrictions to be laid down as to felling, &c. The trees need not interfere to any extent with the area of land under cultivation. There is all over the district where trees are needed sufficient waste land to produce the trees required. In speaking of "waste" land I do not use the word waste as it is understood in the Revenue classification, but in its ordinary sense; there is a very considerable area of the so-called cultivatable land which is, to all intents and purposes, waste, and which might be cropped with trees.

17. I have mentioned that the landscape of the district is exceedingly barren, but this conveys but an imperfect impression of the actual appearance of the country. In the unirrigated tracts there are but few spots on which a man can rest with pleasure. From rising ground in many places no trees are seen for miles, excepting, perhaps, those bordering a chief road. Much of the arable land is lying untilled, temporarily abandoned, and the land has

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untidy appearance from the bushes and tufts of wild vegetation on it. In passing through the country I looked in vain for enterprise and industry which are supposed to be characteristic. Everywhere were evidences of neglected opportunities. In Ireland, a tour of a kind somewhat similar to that I am now referring to, I have shown most satisfactory evidences of what can be done by peasant towards the improvement of land; again and again I saw improvements could have been effected at a moderate cost by no other means, and which amply repaid the enterprising people who had made them; and similar experiences are common in most European countries. The ryot, in his management of his land, falls far short of the peasant cultivator of most other countries.

It is not to be lost sight of the fact that, in some places, the ryot has done a great deal more for the land than merely to perform the acts of cultivation; the land, I am aware, has been sunk entirely at the expense of the ryot, and the land under irrigation has also been laid out at his cost, but the total area of land in this district, influenced by these improvements, is not 200,000 acres, leaving 2,000,000 acres of occupied land altogether untouched by such improvements. It has been said that a peasant cultivator, when holding land on a secure tenure, will convert a wilderness into a garden, but that such is not always the case is amply evident from the condition of much of the agricultural land in this district. I have long held the opinion, and my experience in this country has amply verified it, that security of land tenure alone will not suffice to ensure good farming.

19. The condition of most of the agricultural villages is very unsatisfactory. In most civilized countries the village is associated with all that is healthful and pleasant, but the majority of the villages I passed through during my tour are characterised by conditions quite the reverse of these, and this was specially noticeable after my brief sojourn in the town of Coimbatore, the sanitary state of which has reached such perfection. Not only do most of the villagers live in wretched hovels in which it is almost impossible that good health can be secured, but, from the untidy and dirty habits of the people, everything around these hovels tends to the production of ill-health. I am aware that many of the inhabitants of these villages have nothing to spend further than suffices for bare existence, but I am also aware that most of these people have, during the long dry season, a great deal of unoccupied time at their disposal which, it might reasonably be expected, they would utilise in improving their dwellings and the state of the surrounding ground. If it is true, and I have every reason to believe that it is, that the working members of these village communities lose, on the average in the year, from four to six weeks' labour earnings, from sickness produced by the bad sanitary conditions of these villages, the people would have great cause for thankfulness if some measures could be devised by the employment of sanitary police or other means which would ensure better sanitary conditions. I speak thus of the villages from a very unpleasant personal acquaintance with many of them. In passing through the country, especially in the early morning, one of the first indications that we were approaching a village was a sickly odour of decomposing excreta. I consider that the bad sanitary conditions of most of the villages is a great agricultural evil. From the sickness that results, the people do not enjoy that robust health which is so essential for the proper performance of out-of-door agricultural duties, and frequently they are incapacitated for physical exertions at the most important agricultural season of the year.

20. I camped near, and passed through, many villages, in which it was impossible to obtain any water fit for drinking. In many of these villages the chief water supply for the inhabitants was a tank-well which derived its water chiefly from the drainage of the surface excreta-saturated land adjoining, whenever the rainfall was sufficiently heavy. Surely, in regard to the improvement of the water supply for drinking purposes, something can be effected; if the people cannot afford to pay the cost of making any needful improvements, they can themselves, at any rate, afford the labour. Each villager had better work for one week in the year in aiding in the improvement of the sanitary condition of the village than that each working villager should lose from sickness at least from four to six weeks' wages in the year, and have his other constitution undermined.

Villages to which irrigated land was attached were in most instances better than those just referred to. Not only were the dwellings larger and more substantial, but they were much more tidy and cleanly; however, there are but very few in number in comparison with the number of the district.

As far as could be learnt from observation, the people, generally, in the irrigated parts of the district appeared to possess but few resources upon which to fall back in times of scarcity. The stack yards of villages to which irrigated land is attached, were, generally, well filled; but in the unirrigated parts of the country, I frequently travelled for miles without seeing a stack of any kind, and it must be remembered that, at the time of my tour, a very considerable proportion of the cereal crops had just been gathered. However, judging from the appearance of the crops that were then standing, it would require the labour of many acres to make a decent-sized stack.

The general opinion I formed of this district was very different from the opinion I held of it before going on the tour. I had frequently passed on the way through the portion of the district between Erode and Mettappolium, and I had also travelled along the line between Erode and Caroor; and, from what I had then seen, it appeared to me that the district was a flourishing one from an agricultural point of view; however, I now know that the railway line passes through some of the most favoured portions which are irrigated by the perennial rivers, Bhowany and Noyel. Between Erode and Caroor the Calingaroien Channel accompanies the railway line almost the entire distance, and near Pothanore the water of the Noyel Channel, on the fertile land in the neighbourhood, produces a most luxuriant vegetable growth. Observations made of a country from a railway carriage when travelling at the usual speed, are often most misleading. I was particularly struck in regard to this, from having an opportunity of afterwards examining, in the fields, some of the crops, which I had seen from the railway train when going to Coimbatore from Madras. It not only do the crops appear much better than they really are, but the area under crop seems much greater than it really is; patches of irrigated land of one or three acres in extent are seen and noted, and the impression dwells in the mind while hundreds of acres of untilled waste pass unobserved.

THE FARMING OF THE LAND IRRIGATED BY RIVERS AND TANKS, &c.

24. In the Coimbatore district irrigated land forms only about 4 per cent. of the land under cultivation, but it pays one-quarter of the entire land revenue of the district. The average rent derived from this irrigated land is about 7½ rupees per acre, whereas the average rent of the dry land under cultivation is only about 14½ annas per acre. The total area of land in this district irrigated by means of rivers and tanks is 106,187 acres, of this 10,490 acres is inam land and 7,075 acres is waste; the area of Government land under culture is only 88,622 acres. The following shows the irrigation sources:—

	Area, Acres.
The Cauvery River	4,158
„ Bhowany River	25,679
„ Ambravutty River	21,056
„ Anliar River	4,243
„ Noyel River	14,904
„ Jungle Streams	5,779
„ Rainfed Tanks	12,803
Total	88,622

25. I gave much attention to the chief rivers of the district. The Bhowany I met with first at about 10 miles to the west of Mettappolium, and I followed it down to several miles to the east of that town; I again met with it at Sattiamangalam, from which place I followed it to the town of Bhowany, where it joins the Cauvery. From Bhowany I followed the Calingaroien Channel down to the Noyel River, about 12 miles to the north-west of the town of Caroor. I saw the Cauvery at Bhowany and again near Nerur. At Caroor I

met with the Ambravutty, which I followed for some distance along its banks in the Darapuram Taluq. The Noyel river I saw of Coimbatore, at Payrur, at about six miles to the south of it again, where it joins the Cauvery. The Palaur and Auliar rivers, at the foot of the Annamalai hills, a few miles to the south of Pollachy. At the time of my tour the Bhowany and the Cauvery were the only rivers in which there was a moderately good flow of water. The river was flowing only for a short distance beyond Payrur; lower at another place where I saw it, about six miles to the south of Avenabel of the river was dry in many places, while at its lower end, near Cauvery, there was no water whatever. The bed of the Ambravutty near Caroor, was dry, but further up, near Darapuram, and as much further went, there was a small flow of water. The beds of the Palaur and Auliar rivers were nearly dry. The wet cultivation, under rivers in operation at the time of my visit, was therefore confined to the land watered by the Bhowany and its irrigation channels, some land watered by a channel of the Cauvery near Nerur, a few blocks of land in the neighbourhood of Darrur watered by the Ambravutty, and the land in the neighbourhood of Poimbatore watered by the Noyel river.

26. It has been stated that the river irrigation supply in Coimbatore is thoroughly utilised as far as this is possible, but the results of my observations lead me to form a different conclusion. Irrigation water is not so great of the district, and I feel convinced that no great difficulty would be experienced in increasing considerably the area of land under river irrigation. The drainage of nearly the whole district is towards the east into the Cauvery, which, after heavy rains, receive immense volumes of water from the Coimbatore District, judging from the great width of the beds of the streams near their junction with the Cauvery, and the recent evidences of their show of floods.

27. It may be true that the drainage water from Coimbatore produces good results as it could have effected in the Coimbatore District, while Tanjore would not suffer to any serious extent from losing the water Coimbatore would benefit very largely from retaining it, or the greater part of it.

28. The area irrigated by river water might be very considerably increased with the water now available for irrigation, if the cultivators could be induced or compelled to use the water in a less lavish and wasteful way than is universally the practice, where the only trouble connected with the application of the irrigation water is the raising of a sluice door.

29. The land under river irrigation is almost exclusively cropped with paddy; raggy is sometimes grown upon it, but this is only occasionally, and when there is any doubt as to there being sufficient water to mature a crop of paddy.

30. The largest quantity of paddy is produced in the Erode and Sattiamungala Taluqs, under irrigation from the Bhowany river. The next largest producers of paddy are the Caroor, Darapuram, and Oodumulpettah Taluqs; in the latter Taluqs the Ambravutty supplies the irrigation water. During the official year 1874-75 there were 72,000 acres under paddy. There is nothing worth special notice in the cultivation of the irrigated land; it differs in no respect from the practice in other parts of the Presidency.

31. The usual practice when irrigating paddy with water supplied by gravity is to apply daily a quantity sufficient to cover the ground to a depth of two inches; half of this, or one inch in depth, the ryots say is absorbed by the soil, and the other inch flows off upon the neighbouring land, the owner of which takes from the distributing channel another inch, in order that his land may be covered to a depth of two inches; he, in his turn, passes off half of the water to his neighbour's land. In this way the quantity of water actually consumed is a depth of one inch daily over the area under crop, or for raising and maturing an acre of five months' paddy a volume of water *one acre in area and twelve feet deep* is required. Such a deluge of water would ruin an ordinary land situated on the level, but fortunately for the cultivators of the

the water is, in most instances, at a much higher altitude than the land and this has admitted of the land being laid out in terraces; the possibility of the irrigation water accumulating on or in the land is prevented, and the land is not so liable to be injured by the water, as it is when it is sent to prove injurious, is provided against.

I am convinced that on most of the irrigated land, were the soil properly tilled and manured, there would be no difficulty whatever in producing as good crops of paddy as are now grown, with one-third, or, at the outside, one-half of the quantity of water now usually employed.

32. On terraced land when the soil is not properly tilled, not manured, or manured only with exceedingly small dressings, it undoubtedly pays the ryot to use the irrigation water very freely, *provided it contains silt*. In such cases the water, to some extent, supplies the place of the manure. The terraced paddy land is not likely to be brought into a swampy state whatever quantity of water is applied. The terraces are so many filter-beds placed in the form of steps, the highest being, of course, nearest to the irrigation source.

33. When the rivers are in flood, their waters, I am informed, contain a very large quantity of suspended silty matter, and at the time of my tour, though there had been no rain for two months or more, the water of each of the rivers, when placed in a vessel and left undisturbed for a few hours, deposited a distinct layer of fine silt. The beds of the rivers, as far as I saw, afforded but little evidence of much silt being brought down, but this absence of silt deposits in the river beds may, I think, be due to the rapidity of the current during the time of floods. A large amount of silt may be deposited on the land by the irrigation water from these rivers, and yet there may be but little evidence in the river beds that silt is brought down. A rapid current may prevent the deposit of the suspended silt, until the water reaches the field and becomes stationary. An enormous amount of silt is undoubtedly brought down into the low country by the rivers that rise in the Neilgherries, and the other high ranges of hills; the cultivators of land on the slopes of the Neilgherries know to their cost, what a quantity of fine soil is, during heavy rains, washed down the slopes into the neighbouring streams.

34. In one or two places where, at the time of my visit, the irrigation water used was almost clear, I found some luxuriant paddy crops, growing on land which had not received any manure for years, excepting a few cart-loads, per acre of the green plant of madder and wild indigo. In these instances the crops may have been feeding on silt previously deposited, brought into activity by the irrigation water. It is, of course, possible for a water to be clear, and yet for it to possess highly fertilising properties indeed; a water may contain in solution plant food of the utmost value. As before noticed, the principal rivers in Coimbatore rise in the ranges of mountains which border the district, and as these mountains are formed chiefly of primary rocks in which potash felspar is one of the principal constituents, it is probable that the rain in passing over and through these rocks, may take up potash and carry it down into the streams below; and in this way, the irrigation water may contain a considerable quantity of potash, a mineral which enters largely into the food of all agricultural crops. Again, a clear water may contain a large quantity of carbonic acid gas, and this is the case, especially with the water of jungle streams which rise in and flow through land covered closely with rank growing vegetation. We know that the Coimbatore rivers obtain their water chiefly from such jungle streams, and we may reasonably take it for granted, that their waters do contain a large percentage of carbonic acid gas. The great solvent properties of carbonic acid gas are well known; when carried into the soil by the irrigation water, it acts upon and sets free large quantities of previously inert plant food, and in this way contributes to the production of a good crop. Of course, there is a wide difference between the action of an irrigation water containing potash, and that of one containing only carbonic acid: the former supplies, directly, the material which aids in the production of the crop; the latter merely stimulates into activity the plant food previously in the soil, hence a piece of land irrigated by the former water may be maintained in a fertile state for years, while land irrigated by the latter becomes gradually poorer and poorer as each successive crop is removed. But a water may contain no appreciable quantity of either potash or carbonic acid, and yet

it may produce good effects when used in irrigation. Air is as water for the healthy growth of the roots of most plants. water is properly applied, that is, when it filters down through with it a large quantity of atmospheric air, the oxygen of which previously inert plant food and brings it into activity, in much the carbonic acid.

36. My own impression is, that the good effect produced by the waters of this district is primarily due to the silt deposited on the irrigated land at certain seasons of the year; for I made frequent inquiries when visiting this land regarding the yield of the crops it now produces, and the yield of those it produced 20 or 30 years ago, and the invariable reply I received was, that the crops now produced yield quite as satisfactorily as those grown on the land 20 or 30 years ago. Now, if the good effect of the irrigation water was due only to the solvent action of carbonic acid or oxygen the water might contain, it is clear that the soil would have become less productive year by year as the plant food in the soil was used up by the successive crops.

37. I have said that in this district good crops of paddy might be raised by one-third, or, at the most, one-half of the quantity of water now usually employed, provided the ryot manured and tilled his soil properly. If the irrigation effects are due chiefly to the action of silt, it is clear that the less water the ryot uses, the less silt will his land get; from the ryot's point of view then, with such water, it is desirable to employ as much as can be obtained; but the question assumes altogether a different aspect when viewed from the stand-point of the State, which supplies the water, and which has 90 per cent. of its land altogether without water. In this country where irrigation water is so invaluable, and where, in some seasons, from its absence, so much land is unproductive, it is, I think, a serious mistake to allow irrigation water to be used so lavishly, merely that the ryot may thereby be saved the trouble and expense of properly tilling and manuring his irrigated land. If the State, in order to provide manure for the land of the ryot, is obliged to supply twice as much water as is absolutely necessary, it is clear that it is providing the manurial matters at a most excessive cost.

38. To produce an acre of paddy, as I have already shown, a volume of water is required of one acre in extent, and 12 feet deep, or about 3,267,000 gallons; estimating that each gallon contains 10 grains of suspended silty matter, capable of being deposited on the irrigated land, this would represent a dressing of silt at the rate of about two tons, or about six cart-loads, per acre, a very liberal manuring for a crop of paddy.

39. The water of the Calingaroyen Channel, after a drought of several months' duration, was found, by Mr. Charles Benson, M.R.A.C., to contain three grains of silt per gallon. He examined two samples of the water, one from near the head of the channel, and the other from the portion of the channel near Erode; the former contained only three grains of silt per gallon, while the latter, which was taken at a place about 10 miles lower down the channel, contained five grains per gallon. This extraordinary result was afterwards explained by the fact, that the sample from near the head of the channel was taken one day earlier than the other sample, and that there was in the interval, a fall of rain amounting to 27 inches. If such a slight fall of rain as 27 inches will add two grains of silt per gallon to the water, it will readily be understood, that during the monsoon rains, when the paddy crops are being irrigated, a very large quantity of silt must be in suspension in the irrigation water.

40. Of course, if only half the usual quantity of water was used, there would be a loss in the year, for each acre cropped with paddy, of one ton of silt, which would have to be made good from other sources, if the ryot would keep up the fertility of his soil.

41. The ryots who hold river irrigated land are generally in much superior circumstances to those who rent dry land only; their dwellings are much more substantial and roomy, and the people seem to be in comfortable circumstances. I was sorry, however, to observe that these ryots, who might be expected to be better

better farmers than their poorer brethren, practised a system of husbandry in no way superior to that, followed by the poorest ryot in the district. The very circumstances which have tended to raise these men a little higher in the social scale than the poorer cultivators of dry land, have tended to produce results antagonistic to improved farming; for in most instances they, instead of cultivating the land themselves, sub-let it under an agreement for one or more years to under-tenants, who, rarely possess any capital excepting sometimes what is represented by two or three pairs of under-sized plough cattle. In different parts of the district there is a difference in the terms stipulated for tenancy; in some places the sub-tenant finds the working cattle, does the whole of the labour from seed-sowing until thrashing, supplies the seed, and such manure as is used, and in return he receives of the produce from one-tenth to one-third of the grain, according to the productiveness of the land, and one-half of the straw; the ryot, of course, pays the Government rent out of his share; when the ryot finds the plough cattle he takes the whole of the straw, and when he finds the seed he takes half of the straw. Very frequently the sub-tenant stipulates to give a fixed quantity of clean paddy for each acre of ground he rents from the ryot. As, in most of these instances, the sub-tenant's interest in the land ceases after the removal of the crop, it is not likely that he will do anything by adopting superior culture, or, by using manure, to improve the condition of the land.

42. The position of most of these sub-tenants is extremely bad; in a good season they but just manage to comply with the conditions under which they hold the land, but in most seasons they are unable, from the produce of the land, to pay to the ryot the stipulated quantity of grain, and to repay him, along with the interest, the advances of grain received for their daily support during the growth of the crop. The consequence is that most of these sub-tenants are deeply involved in debt to the ryot, and are practically his serfs. The ryot, in dealing with his sub-tenants, exacts fully the terms agreed upon; if the crop does not return as much grain as the sub-tenant promised to pay, the ryot takes the whole crop, and the balance remaining stands to the debit of the sub-tenant at a fixed rate of interest in grain.

43. As before noticed, good crops are produced on much of this river-irrigated land, but this is due entirely to the peculiarly favourable conditions met with on such land. I saw land which was said to produce annually in an average season in two crops from 1,200 to 1,300 Madras measures of paddy, without the aid of any manure excepting three or four cart-loads of the green plant of madder of wild indigo. But the water expended on an acre of land in producing such crops would, under good management, have sufficed for the requirements of four or five acres of wheat or maize, one acre of which would have yielded as much human food as the acre of paddy.

44. The right of occupation of much of this river-watered land now commands a high price, sometimes as much as from 200 to 250 rupees per acre, while that of much of the adjoining dry land would not fetch more than 8 or 10 rupees per acre. I was shown some irrigated land for which 20 years ago the right of occupation was considered to be worth only 50 rupees per acre, but which now is valued at 200 rupees per acre; this great increase in value was not due to any improvements having been effected by the lessee or puttah-holder during these 20 years, but to the largely increased money returns now realised from such land. When the ryot has, at much personal labour or expense, converted dry land into irrigatable land, by altering its surface and laying it out in terraces, he has, of course, a perfect right, when transferring his holding to an incoming tenant, to demand the full value of the improvements effected; but when the increased value is due to causes over which he has no control, the State should, I think, share in the larger returns. In most instances the present high value of the right of occupation of this land is not due to any improvements effected by the occupying tenant, or by any of his predecessors, but to the great increase in the population, and the consequent increased local value of agricultural produce. When the right of occupation of irrigated land, situated in ordinary agricultural localities, commands rates out of all proportion to what would represent a fair return on the capital originally sunk in converting the land into irrigatable land, it is clear that the rent paid by such land must be very moderate. In many places the annual

Government rent for such land is about 9 rupees per acre for one crop, and 12 or 13 rupees per acre for two crops; if such land will yield in two crops, say 1,000 Madras measures worth 50 rupees, the net return to the ryot is a very handsome one.

THE FARMING OF THE LAND IRRIGATED FROM WELLS.

45. In 1871-72 there were in the Coimbatore district 57,437 wells, of which 49,222 were in good repair and in full use; assuming that there are now in the district 50,000 wells, each capable of watering three acres of land, there will be altogether 150,000 acres irrigated from wells.

46. The wells are met with chiefly in the neighbourhood of the large towns and villages. From the presence of these wells the outskirts of many of the towns present a very different appearance to what is seen further out in the district.

47. From conversations with ryots regarding well-sinking, I learnt that many of them would attempt to sink wells if there was any certainty of meeting with water at a moderate depth, without the necessity of cutting through hard rock. I was shown several places where ryots had gone to much expense in attempting to sink wells and had failed. Well-sinking as conducted by the ryot is attended with great uncertainty, and as the wells cost frequently from 150 to 300 rupees, it will readily be understood that after half completing a well and expending a sum equal to, say one-half of its estimated cost, it is a very serious matter to a ryot to have to abandon the work.

48. Of course the greatest uncertainty attends the sinking of the first well in a locality, and there are but few cultivators willing to encounter the risk.

49. In tracts of country suited for wells, but which are yet without them, Government might, I think, set the example in well-sinking; if successful, the probability is that the ryots would follow the example and sink other wells in the locality, and in this way the general revenue of the district would be made more certain. To meet the interest on the capital outlay in sinking these wells, a water rate might be charged on the land watered from them.

50. I was surprised to find so little known regarding the Land Improvement Act, under which ryots could so readily obtain money on reasonable terms for use in sinking wells. I informed many of the ryots the terms under which they could, under this Act, obtain money for well sinking, and they generally expressed their readiness to sink wells if provided with money in accordance with the terms of the Act. Some considered that there should be a provision in the Act, under which the outlay should not be chargeable against the ryot when the further sinking of a well had to be abandoned, from hard rock being met with, or from the water-bearing strata being found to be too far down. They said that it would be a great hardship, if a man borrowed, say 200 rupees from Government, and after expending half of the amount in an unsuccessful attempt in well-sinking, that he should be called upon to make good the loss. I explained to them, that if in the place where it was proposed to sink a well, a well-auger was first used, to test the depth of the water-bearing strata, and the nature of the rock overlying it, there would be but little risk in sinking the well, but they still contended that Government should bear the loss when the sinking of a well had to be abandoned.

51. Of course there will always be some amount of risk attending the sinking of a well, but if the ryot makes the attempt in the place pointed out to him by an officer of Government appointed for the purpose, and it becomes necessary for any reason to abandon the work before completion, I think that the ryot should not bear the loss. It would only be in rare instances, if proper precautions were taken, that it would be necessary to abandon the work when only partially completed, and such losses might be recovered by the State, by slightly increasing the interest chargeable on money advanced for well-sinking.

52. There is, I think, but little probability of there being a large increase in the number of wells in this district as long as the sinking of a well is attended with a risk such as will frequently represent the loss of a sum, equal to a whole year's

year's income of a ryot; and a half or even 1 per cent. added to the rate of interest chargeable for money advanced by the State under the Land Improvement Act would be no hindrance whatever, to those desirous of sinking wells.

53. Of course in parts of the country where there are already many wells, great caution would have to be exercised in increasing their number, or injury may be done to those already existing from their water supply being lessened.

54. There are considerable tracts of country yet without wells in all parts of the district in which wells might be sunk, and where subterranean water is as likely to be met with quite as near to the surface, and in as large quantities, as in other parts of the country where there are wells.

55. Superstition guides the Coimbatore cultivator in the choice of a site for a well; generally he procures a sheep and drives it to the land in which he desires to sink a well; he then pours some water over the head of the animal and sets it at liberty, it wanders over the ground and the spot of land over which it shakes its head, to get rid of the moisture is the place in which the well must be sunk. I could never get from any ryot any satisfactory explanation of the reason they had in following this ridiculous practice; they admitted when pressed, that the result of sinking wells in sites so selected, was often highly unsatisfactory. The prevalence of this superstitious custom shows what uncertainties attend well-sinking in this district, for the men who follow this practice frequently possess a good deal of common sense in regard to matters which daily occupy their time and attention. They select their site for the well in much the same way as men in other countries decide a course of action on the result of the throw of a coin. However, the Coimbatore custom is quite as sensible as the practice adopted in other countries, when the divining-rod is used in the search for water.

56. It is highly unsatisfactory, that an improvement such as the sinking of a well, should be attended with such uncertainties when it is in the power of the State, at a very trifling expense, to do away with many of these uncertainties.

57. The ryots, when told that it was possible to bore down through the ground by means of an auger to the water-bearing strata were much delighted, and expressed their great desire that each taluq should be provided with one or two of these augers. I would strongly advise that a couple of augers should be obtained for use in the Coimbatore taluq; in the first instance, they should, I think, be placed in the charge of an intelligent Overseer of the Public Works Department; after a little practice, under different conditions he would be able to select the most suitable places for boring for water, which places might be marked by a stone, and the exact position noted on the village map, with information showing the nature of the strata passed through, and the depth at which water was found. After such experimental tests had been made, the ryots might sink the wells at any time, when most convenient, when labour and money are available.

58. Throughout the district cattle-power is everywhere employed for raising water from wells. The water is lifted from the well in a skin bucket; to the bucket is attached a rope, which, at its other end, is fixed to the yoke of a pair of cattle; a roller or pulley is fixed about four or five feet higher than the discharging trough, and slightly over the well over this roller, or pulley, the rope travels as the bucket ascends or descends. The bullock path is a very steep incline. When raising the bucket the cattle walk down the sloping path until the bucket reaches the full height and discharges its contents, when the cattle are again backed up the slope, and the bucket again sinks into the water to be again raised by the forward motion of the cattle, and thus the process is again and again repeated. This arrangement is certainly very simple; however the cost of raising the water is very great. From experiments I made during my tour, and from the information I then gathered, I find that, when the water is to be raised about 20 feet, it costs the ryot two rupees for watering an acre of ground once, with an application of water equal to about 23,000 gallons, which is an average watering and equal to a rainfall of about one inch.

59. As an ordinary crop of cumboo, cholam, or, raggy, receives during

growth on the average from 10 to 12 waterings, it will be seen that the water costs the ryot from 20 to 24 rupees for each acre, of any one of these crops he produces on land irrigated from a well.

60. The following shows the cost of raising water from a well of average depth, by the water-raising arrangement just noticed :—

Depth of the water below the surface of the ground	- -	20 feet.
Cost of the pair of cattle required	- -	40 rupees.
Cost of earthwork, cistern, and woodwork	- -	20 "
Cost of skin-bucket and rope	- -	6 "
Duration of skin-bucket and rope	- -	3 months.
Number of buckets emptied per hour	- -	65
Contents of the bucket at the point of discharge	- -	20 gallons.
Time occupied by the cattle in going down the slope	- -	10 to 15 seconds
Time occupied by the cattle in backing up the slope and making ready for return journey	- -	45 seconds.
Day's work	- -	6 hours.
Daily pay of driver	- -	2 annas.
Daily pay of water-distributor	- -	1 1/2 "
Daily hire of cattle (when hired)	- -	6 "

The cost per day will be as below :—

Hire of cattle	- - - - -	Rs. a. p.
Hire of driver	- - - - -	- 6 -
Hire of water-distributor	- - - - -	- 2 -
Interest, and wear and tear, at 10 per cent. per annum, on the capital invested, 66 rupees, charged over 250 working days in the year	- - - - -	- 1 6
Cost of replacing buckets and ropes, once, in three months, charged over 250 working days in the year	- - - - -	- 5 -
	- - - - -	- 1 2
TOTAL	- - - - -	Rs. - 11 1

It takes, on the average, three days' full work to water one acre of land, the cost per acre is thus Rs. 2. 1. 3. When the ryot employs his own cattle, which is the usual practice, and drives them himself, which is also usual, the actual outlay, of course, will be less, but the amount saved will be but a poor return to the ryot for his labour and the labour of his cattle; and it must be remembered that as the work is severe, the cattle do not last long, and require to be replaced at sometimes very short intervals. The expenses cannot, therefore, be put at less than the sum I have mentioned. The working hours are generally from 7 a.m. to 10 a.m. and from 3 p.m. to 6 p.m. daily, that is, six hours in all. Assuming that the work, throughout the working hours is performed in a regular way, and that 65 buckets, each containing 20 gallons, are raised per hour, the total quantity raised during a day will be 7,800 gallons, at a cost of 11 annas 1 pie, or about 11,260 gallons for one rupee. This may be accepted as the average cost incurred for raising water from wells; the wells are, in some places, from 30 to 40 feet in depth, but in other places they are only from 12 to 15 feet deep, and I think that there are many more wells under 20 feet in depth than there are of a depth greater than 20 feet. There is in different parts of the district a considerable variation in the size of the buckets used; I measured some buckets that could only contain 10 gallons of water, and I measured others that would contain 25 gallons at the least.

61. I was glad to see in the town of Coimbatore, eight improved water-lifts at work, all of the kind known as the "Double Mhote;" they were made from a model supplied by the Sydapet Experimental Farm. I learn that there is every prospect that this improved water-lift will be adopted in this district. The experience gained with the lift by the Coimbatore municipality, has been of the most satisfactory character; the lift raises, when worked by one bullock, as much water as was formerly raised by two of the ordinary water-lifts, each worked by a pair of bullocks.

62. The following shows the capabilities of one of these improved water-lifts; the working data were obtained from the experiments made at Sydapet; but the calculations

calculations are based on the rate of wages, cost of materials, working hours, &c. prevalent in the Coimbatore District :—

Depth of the water below the surface of the ground	- -	20 feet.
Cost of the bullock required	- -	53 rupees.
Cost of timber, bricks, lime, and labour	- -	100 "
Cost of the two skin buckets and the ropes	- -	15 "
Duration of skin buckets and ropes	- -	3 months.
Number of buckets emptied per hour	- -	90
Contents of each bucket at the point of discharge	- -	30 gallons.
Day's work	- -	6 hours.
Daily pay of driver	- -	2 annas.
Daily pay of water-distributor	- -	1 1/2 "
Daily hire of bullock (when hired)	- -	4 "

The cost per day will be as below :—

Hire of bullock	- - - - -	Rs. a. p.
Hire of driver	- - - - -	- 4 -
Hire of water-distributor	- - - - -	- 2 -
Interest, and wear and tear, at 10 per cent. per annum on the capital invested, 150 rupees, charged over 250 working days in the year	- - - - -	- 1 6
Cost of replacing the buckets and ropes, three times a year, say 60 rupees, charged over 250 working days in the year	- - - - -	- 2 10
Oil, &c.	- - - - -	- 6 -
TOTAL	- - - - -	Rs. - 11 10

The cost per day for working this machine is therefore 11 annas 10 pies. When working at the ordinary speed, 90 buckets are raised per hour, and as each bucket contains 30 gallons when at the point of delivery, the quantity of water raised per hour is 2,700 gallons; or, in a day of 6 working hours, the quantity raised is 16,200 gallons. For an expenditure of 1 rupee, 2,000 gallons of water can be raised to the height of 20 feet by the improved lift, against 11,260 gallons, raised for 1 rupee, by the old fashioned lift.

63. To irrigate an acre of land with the quantity of water generally used, the cost will be, by means of the old-fashioned water-lift, Rs. 2. 1. 3., or by the improved water-lift, Rs. 1. 1. 1.

64. I have mentioned before that a crop of raggy, cumboo, or cholom, when grown with the aid of well water, receives from 10 to 12 waterings; the cost then of the irrigation water for an area of one of these crops will be, when the unimproved lift is used Rs. 22. 13. 9., or, when the improved lift is used, Rs. 11. 11. 11.; thus showing a saving of about 11 rupees per acre; and the saving will be greater in the case of many other of the crops raised with water from wells from the greater quantity of water required.

65. We have in this district, as before noticed, 150,000 acres of land irrigated from wells by means of these unimproved lifts; if then it is possible to save 11 rupees on each acre of crop raised by substituting the improved lift for that now in use, a total saving might be effected amounting to at the least, 2,000,000 of rupees per annum, for it must be remembered that much of the land bears two crops in the year.

66. We often hear of the poverty of the ryot, and yet we find that in the district of Coimbatore alone, on the small area irrigated from wells, a saving in the annual expenses of the ryot could be effected, that in the aggregate would be nearly equal in amount to the entire annual rent of the district payable to the State.

67. Water, manure, more cattle labour, and more manual labour are imperatively demanded by 90 per cent. of the cultivated area. By adopting the new water-lift, the ryot will be able to water double the area he was previously able to irrigate; if he prefers not to extend the irrigated area of his holding, he will have cattle labour and manual labour set free for collecting and bringing manure to his land, and for the more thorough tillage of his soil, &c. &c.

68. Not only is it possible to reduce greatly the cost of lifting water from wells, but the water after being raised might be made to go a great deal further than it now does if proper means were taken. As a general rule, the wells of the ryot contain but a very small percentage of organic matter, and the tendency of his farming is to reduce this small percentage still lower. The action

action of organic matter (humus) in the soil is well known, it enables the soil to take up moisture from the air, and to store up that moisture ready for the use of plants. An application of a quantity of water equal to half-an-inch of rainfall on a soil containing 5 or 6 per cent. of organic matter, will produce better and more continued effects than a quantity of water equal to one-inch of rainfall will on a soil containing only 2 or 3 per cent. of organic matter, other conditions being equal. In other words, if the soil were properly manured and tilled, the quantity of water that now suffices only for three acres, would suffice for six acres, and the effective work of a well would be doubled. There would be no practical difficulty whatever in increasing largely the organic matter in the soils; it would only be necessary that the ryot should use farm-yard manure in manuring his soil, instead of burning the dung of his cattle, or that he should plough into the soil one or two green crops. The general use of cattle dung as fuel is the curse of Indian agriculture, not only is the soil deprived of so much direct plant food, but the physical conditions of the soil are seriously deteriorated when it is cropped without the aid of organic manure. Mr. Schiffmayer, in his experiments, elsewhere reported, found that the soils of the Sydapet Experimental Farm had their powers of absorbing and retaining moisture increased 10 per cent. by the addition of 5 per cent. of organic matter.

69. Much more skill is exhibited by the ryot in the cultivation of the land irrigated from wells than in the cultivation of either river irrigated land, or ordinary unirrigated land.

70. The cropping of the land irrigated from wells is very varied. Cholum, cumboo, and raggy occupy the largest area; in some portions of the district, land irrigated from wells is cropped only with these crops; as before noticed the ryot recognises garden cultivation of each of these cereals, and as he varies his land that is irrigated from wells, the crops have acquired of early maturity.

71. As a general rule, the crops standing at the time of my tour on land irrigated from wells were good as regards length of straw and uniformity of growth, but the heads or ears were generally very small, and badly filled with grain.

72. Tobacco is largely grown in the district, and it is raised almost exclusively on the land dependant on irrigation from wells. The area annually cropped with tobacco is about 20,000 acres. The crop is grown throughout the district. The climate of Coimbatore is generally well suited for the production of tobacco, but it is ill-suited for the curing operations; hence tobacco grown there should either be sent to a more genial climate to undergo the curing processes, or it should be cured in factories erected for the purpose in which the peculiar atmospherical conditions required may be secured.

73. The late Government Quinologist, J. Broughton, Esq., examined chemically a number of samples of tobacco, which had been produced in different parts of this district. The following are some of the results obtained:—

Where Grown.	Per Cent. of Ash.	Per Cent. of Carbonate of Potash in Ash.	Per Cent. of Nicotine.
Coimbatore	22.856	2.94	3.32
Ditto	22.006	5.04	4.95
Ditto	19.923	7.92	4.90
Pollachy	24.987	4.39	1.95
Moocasi-poodoor	25.73	7.07	2.24
Coorchy	26.39	7.93	1.17
Poondoray Semoor	23.34	2.65	1.29
Aval	23.49	19.97	1.46
Monigumpollum	26.65	2.61	2.95
Madhally	23.45	5.33	2.32
Sattiamungalum (A)	17.00	14.74	2.53
Ditto (B)	21.34	3.87	2.72
Ditto (C)	25.14	9.14	3.02

It will be observed that the percentage of carbonate of potash found in the ash of the tobaccos, varied very considerably, and it is, it must be remembered, upon the presence of this salt in the tobacco in a sufficient quantity that its proper burning so greatly depends. Mr. Broughton also examined a sample of Havana and of Manilla tobacco which had been produced in the district; the result was as follows:—

Variety.	Per Cent. of Ash.	Per Cent. of Carbonate of Potash in Ash.
Havana	22.55	6.18
Manilla	23.25	10.25

The tobaccos contained only a very small percentage of nicotine, and their flavours were considered by Mr. Broughton to be very good. With reference to these tobaccos, he wrote in his report:—"I consider that these samples show that foreign tobaccos, if grown in suitable localities in South India, can be produced of their foreign quality. The Manilla tobacco, if it had been cured with care by a European or instructed Native would, I am convinced, have possessed the high qualities of foreign Manilla tobacco." These samples were produced in the Erode Taluq on an ordinary red soil. The best tobaccos are said to be produced in the Taluqs of Coimbatore, Sattiamungalum, I saw tobacco growing in all the Taluqs I visited, and in the southern Taluqs is never different crops growing in all. However, the tobacco of the Taluqs. If ever the production of tobacco becomes a government monopoly in this Presidency, the district of Coimbatore would have great facilities for the production of tobacco on a large scale. There are good tobacco soils in all the Taluqs, but the Taluq of Sattiamungalum would, I think, afford the best soils and the most favourable climate for the curing operations.

74. It is said that the red soils produce the best qualities of tobacco, and I should certainly prefer these soils as they are generally more friable and porous, and do not bake and contract during a slight drought to the same extent as do the black soils. The season in which tobacco is sown varies in different parts of the district, but, generally, August and September is the sowing season. The seed is usually sown in nursery beds and the young seedlings are transplanted out into the field when from six weeks to two months old. There is nothing worth special notice in the tobacco cultivation of this district. Ryots always endeavour to put their tobacco land in a good manurial condition; they fully recognise the exhausting nature of the crop and the demand it makes upon the soil. Tobacco land is usually manured by folding sheep upon it, and occasionally by dressings with village ashes. Tobacco land usually bears a crop of raggy in addition to the tobacco during the year. The harvest season for tobacco varies, of course, with the sowing seasons, but, over the district generally the tobacco harvest is in the months of February, March, and April.

75. There is, perhaps, no crop grown by the ryot which indicates more accurately the condition of the soil and the character of the cultivation than does a tobacco crop. It was not unusual in going through the district to observe, almost side by side, crops that would probably not yield 400 lbs. of tobacco per acre, and others that might fairly be expected to yield from 750 to 1,000 lbs. per acre on soils apparently of the same class.

76. The tobacco crop, from the cost of the waterings it receives, is an expensive one; however the returns are good under satisfactory conditions. A crop of 750 lbs., which may be taken as an average one on fairly farmed land, will realise from 60 to 65 rupees; that is, after the leaf has been prepared for the market; and this, after paying the ryot for the labour of himself and his family, and for such occasional labour as he may employ, helps towards the payment of the rest of the holding.

96. If a wheat crop can be raised in the district with a quantity of water equal to about a rainfall of 16 inches, there is surely something very wrong when the ryot is permitted to use, in raising a crop of paddy, a quantity of water equal to a rainfall of 144 inches. There can be no doubt but that an acre of land will, under wheat, produce as much human nutriment as an acre of land under rice.

97. The water of some wells contains mineral food in solution, and when such water is used its influence is greater than that of pure water; however, I do not think that the fertility produced on the land irrigated from wells is due to any extent to the soluble plant food contained in the water, for the ryots generally agreed in stating that their "garden land," which is the land watered from wells, is not productive unless manured. The active growth of crops on land irrigated from wells is due, I think, to the plant food being prepared and maintained in a form easy of assimilation by the growing plant, and to the energies of the plant being stimulated by the favourable physical conditions under which it is growing; the carbonic acid and oxygen brought in the irrigation water playing an important part in the conversion to an assimilable form of the raw plant food in the manure applied, and in rendering active the previously dormant food in the soil itself.

98. Almost the whole of the manure the ryot ever uses is expended on the land irrigated from wells. It consists chiefly of village ashes, and weathered sun-dried cattle dung, but the general practice in manuring this description of land is to fold sheep on it during night, the animals being allowed during the day to graze elsewhere. The efficacy of the practice depending upon the quantity of excreta, solid and liquid, deposited on the land by the sheep during the night. The practice of sheep-folding is a good one, but in the hands of the ryot is not sufficiently developed. It is clear that there can be no increase in the manurial constituents of an arable soil, from the deposit on it of the solid and liquid excreta of sheep that depended for food entirely on the wild scanty vegetation produced on the soil during the dry season. Yet the efficacy of sheep-folding as a means of fertilizing the soil is universally admitted. However, in all civilised countries, when sheep are folded on land, they are provided on the land itself, with green crops produced by the aid of manure, and the sheep receive, in addition, a daily allowance of oil-cake, pulse, or grain, hence the higher fertilising value of their excrement. As sheep-folding is conducted on land in this district there is but a slight increase in manurial matters; the chief good resulting from the plant food being left in a form easily of assimilation by growing crops.

99. Sometimes land irrigated from wells is sub-let, but this is far from being the usual practice. When sub-let the sub-tenant pays the ryot or puttah holder one-fourth to one-third of the grain the land produces, the cultivating tenant retaining the remainder of the grain and the whole of the straw. Under such an arrangement, the cultivating tenant provides at his own expense, the cattle, seeds, manure, labour, water-buckets, &c., &c.; the Government rent is paid by the ryot who holds the puttah or lease. When the ryot finds the cattle, he usually gets one-half of the grain and one-half of the straw.

100. I have referred very briefly to the manuring of the land irrigated from wells, as I intend, when referring to the cultivation of the unirrigated land, to discuss the subject of manures more fully.

THE FARMING OF THE UNIRRIGATED LAND.

101. Of the total area of occupied land in this district, upwards of 2,000,000 acres is altogether unaided by irrigation water.

102. The following statement shows the rain-fall registered in the different taluqs during the past four years:—

Official Year.	Coimbatore.	Sattianangalum.	Collegal.	Pollachy.	Erode.	Blowany.	Palladam.	Darapuram.	Carur.	Oodumalpeta.
	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.
1871-72	24.53	28.55	35.01	42.33	22.40	20.82	20.72	18.94	24.99	28.14
1872-73	25.47	28.45	37.69	29.44	20.53	37.40	18.05	20.50	39.97	20.27
1873-74	22.13	21.37	35.82	27.66	21.81	17.33	17.11	15.37	26.60	24.78
1874-75	19.61	25.87	38.48	32.58	26.90	32.03	12.95	13.32	20.40	20.71
Average	22.93	26.06	36.75	33.02	22.91	26.89	17.06	14.3	27.09	23.47

103. In Collegal and Pollachy the rainfall is fair. As a general rule, over the whole district the heaviest rainfall is in May, October, and November, and the lightest in December, January, February and March.

104. Dry crops are extremely precarious, and unfortunately it is upon the dry crops chiefly that the people must depend for food. On the better kinds of soils, fair results are obtained in average seasons; however, the area of such soils is but small compared with the area under occupation.

105. Since 1857, the area of the unirrigated land has been increased 45 per cent. In the official year 1857-58, the area under occupation was 1,591,976 acres, of which about 85,000 acres was irrigated land, leaving 1,506,976 acres of land unaided by irrigation. In the official year 1874-75, the total area under occupation was 2,298,726 acres; from this must be deducted the 85,000 acres of irrigated land, which leaves 2,213,726 acres of unirrigated land; or there were, in 1874-75, 706,750 acres more of unirrigated land than in 1857-58.

106. I have before mentioned that, after deducting the land permanently settled, the land under Government forests, hill tracts, and "waste," altogether 830,720 acres, there remains attached to Government villages, under the ryot-wary tenure, 3,925,760 acres; of this, 1,725,760 acres is unoccupied, and pays no rent.

107. The large increase in the area of rent-paying land would, of course, be a satisfactory proof of progress, were the land properly farmed; for there can be no doubt but that, under fair cultivation, the inferior soils, in the dry climate of Coimbatore, would yield much more produce, when tilled, than if left to produce natural herbage for pasturage.

108. In this district as well as throughout Southern India, the unrented land has contributed, and does contribute largely to the maintenance of the rent-paying land.

109. The revenue from land has been maintained by gradually bringing more and more of the unrented land under rent. Though the gross land revenue of the district has been increasing, the average rent of the unirrigated land has, during

many of these soils would produce on an acre, under imperfect tillage and without manure; now, as 5 bushels of grain would not command more than 6 rupees in the local market, it will be seen that, after deducting rent, cost of seed, and cattle hire, or cattle keep, the ryot must get but a scanty subsistence in return for the labour he expends on such land, but this deplorable state of things is only what might be expected.

116. If it is necessary that these inferior previously rejected soils must be cultivated, it is clear then that a better system of husbandry must be adopted in order to get out of these soils a fair return; and I am convinced that, unless the agricultural practice in dealing with them is greatly improved, the State will experience greater and greater difficulties on the recurrence of each unfavourable season, in supporting the people dependent on the produce of these soils.

117. Considerable portions of the district are covered by black soils, and some large areas by red soils, but the prevailing soil is grey in colour, and is frequently intimately mixed with, and sometimes covered by, fragments of quartz rock, varying from a fine gravel to pieces of several pounds in weight. These grey soils have apparently been formed by the disintegration of the schistose rocks, gneiss, mica and hornblende, which cover so considerable a portion of the district. From their origin these soils are naturally poor, and when met with on high situations, where they have been subjected to the washing influences of flowing water, they have become very poor indeed from losing their clayey particles. A small area of country situated about five miles to the south of the town of Coimbatore is covered by a calcareous soil resting over a crystalline limestone and in the neighbourhood of Coimbatore a conglomerate limestone is met with near the surface, but the soils resting on it are generally very thin,

and afford but little support to crops during droughts, a serious drawback in this dry climate. The land bordering the lower slopes of the Neilgherry and Annamalai ranges is, in some cases, composed largely of disintegrated rock washed down from the higher slopes, and is fertile. The soils that cover the lower ridges of hills, and the isolated conical-shaped hills which are scattered over the district, are generally very poor and thin, and in most instances almost altogether without vegetation. Considerable tracts of alluvial soil are found in the eastern and southern portions of the district bordering the large rivers, but these soils are generally under irrigation.

118. As a general rule, away from the slopes of the high mountains, the best soils are found at the lowest elevations; the soils appear to be worse and worse with each increase in elevation; indeed the soils of the district might almost be valued according to their elevation; those in the lowest situations being valued highest, and the value decreasing with every 100 feet of elevation.

119. There is little worth special notice in the cultivation of this unirrigated land. The soil is everywhere only shallow ploughed, and the only plough used is that common to Southern India, which stirs the soil, but does not turn it over. In one or two places I saw some very good cultivation, which had been produced by digging the ground over with crowbars; by means of these crowbars the soil had been stirred to a depth of fully 12 inches. This cultivation is performed only on black soils, and during dry weather. Blocks of soil varying in weight from 10 to 20 lbs. are raised and turned over; after a heavy shower of rain these fall to pieces, and a fine tilth is produced. As the clods break down, the roots of grasses, especially of the Hurriallee, which are difficult to remove when the soils are under ordinary tillage, are freely exposed, and can readily be collected. The effects of this crowbar cultivation are supposed to last over 10 or 12 years. The expense of turning over an acre of ground in this way is great; I was informed that it took generally about 80 men one day to dig over an acre of ground, and that each of the men was paid two measures of grain for his work, which would represent a total cost equal to the value of 160 Madras measures of grain, about 10 rupees. The cultivation is, I think, very perfect, and leaves but little to be desired. However, the area of land thus treated in the year is exceedingly small; throughout my whole tour I did not see 100 acres in all undergoing this cultivation, and my tour was in the season in which this species of cultivation is generally performed.

120. A considerable area (about 300,000 acres) of the occupied land is annually under fallow; but this so-called fallow is widely different from what is known as fallow in other countries, for the land is, in most instances, left untouched by the plough or other implement during the whole period it is supposed to be under fallow. Of course, as the land during the period produces no crop, it is resting for a time, but it gains but little from those influences from which land benefits so greatly when fallowed in a rational way.

121. Nothing whatever is known by the ryot regarding "rotation of crops" as this is understood in other countries; I say this advisedly, for I have taken some trouble in making inquiries. In some places I was informed that the ryots did follow a rotation in their cropping, but on making further inquiry, I learned that the so-called rotation existed only in the imagination of my informants. In one place where I made inquiries, I was informed that the so-called rotation was cholam followed by cumboo, in each year repeated again and again, as long as the land would continue to bear a crop. The ryots, of course, understand that certain crops make a greater demand on a soil than others; for instance, it is common to crop land with sugar-cane only every second year; while land is cultivated with cotton in successive years, over a long period. Again, crops requiring much rain are grown during the season of the year in which the rainfall is usually the heaviest, and crops that can be sustained during growth by a moderate rainfall aided by dew, are grown during that part of the year when the dews are heaviest; and the same in regard to temperature; some crops are grown only during the cold season when the temperature is low, and others only in the hot season. A rotation of crops is based on the following:— (1) each kind of crop takes some particular kind of plant food, if any crop is repeated too frequently on a soil the special food on which it feeds will become exhausted in the soil; (2) certain insects always prey on a crop.

Up, and when this crop is grown too frequently on the same ground, these insects multiply to such an extent as to become seriously injurious to it; (3) certain crops grow in an upright position, and in the light open shade they afford, give great encouragement to the growth of weeds, while other crops form a dense shade over the ground and kill down the weeds; (4) some plants have short fleshy roots, and need for their healthy growth that the soil should be open and friable, and in a good manurial condition, while other plants have long and numerous fibrous roots, which enable them to live and thrive under conditions under which a short fleshy-rooted plant would almost starve. There are other reasons besides these given for the adoption of a rotation in cropping, but neither these nor those above given influence the ryot in the management of his land.

122. Nothing is more surprising at first to an agricultural observer in passing through this district, than the remarkable absence of weeds on the unirrigated land. I travelled over considerable areas of land almost without a weed of any kind; however, I observed also that the untilled waste was almost as free from weeds. Though I travelled several hundred miles through the district, frequently at a pace not exceeding 2½ miles per hour, I rarely indeed saw any people engaged in weeding the land. Sometimes, in a journey of 15 or 16 miles, I did not pass a single field in which there were any weeding operations going forward. The absence of weeds, on the cultivated land, cannot be attributed to the industry of the people. Annual weeds appear to be almost unknown, excepting on the land irrigated by rivers or from wells; the long, hot dry season effectually disposes of them. In several localities I saw land which had been lying untilled for some years, and which was, nevertheless, almost bare, and it must be remembered that, although I ended my tour in the hot season, it was begun in the cropping season.

123. The principal crops on the unirrigated land are cumboo (*penicillaria spicata*), cholam (*sorghum vulgare*), and raggy (*eleusine coracana*); these together occupy about 70 per cent. of the area of the occupied land.

124. Cumboo is sown on the red and grey soils during the months of July and August, and is harvested in November and December; it occupies more of the unirrigated land than any other crop. It is grown most largely in Darapuram taluq, but all the taluqs produce a considerable area, excepting Oodumulpett

Oodumulpett and Collegal. The grain of cumboo constitutes the food of a considerable proportion of the people of the district, and its straw is consumed by the cattle. Judging from what I saw, the crop is harvested only when dead ripe, and its straw, accordingly, will possess a much lower feeding value than it might otherwise possess.

125. Cholam stands next to cumboo as regards the area of land occupied. The white variety is most generally grown. It is sown and harvested in the same months as cumboo. Black or red soils are preferred for cholam. In all the taluqs a large breadth of ground is cropped with cholam; the largest areas are in the Pollachy and Pulladam taluqs. The grain of cholam, equally with that of cumboo, is used as human food in the district, while the straw contributes mainly to the support of the draught cattle during nine months in the year.

126. Next as regards area comes raggy, which occupies annually about 150,000 acres of land. Raggy is also sown during the months of July and August, and harvested between the middle of November and the end of January. Raggy is a very important food grain, and is in great demand, not only for local consumption, but for transport to the hills for the use of coffee-plantation coolies. Raggy is cultivated throughout the district, the greatest breadth of land under it being in the Collegal and Coimbatore taluqs; its straw is also highly valued as cattle fodder.

127. In a small portion of the district, where the rains of both monsoons fall, the sowing and harvest seasons are of course different to those I have mentioned. In localities so favourably circumstanced two crops are frequently obtained in the year; a crop of cholam with the north-east rains, and a crop of cumboo with the south-west rains.

128. The three crops just noticed are grown to some extent on land irrigated from wells. Ryots distinguish two varieties of each; they speak of "garden cumboo" and "field cumboo," "garden cholam" and "field cholam," "garden raggy" and "field raggy." There is a very marked difference in the time in reaching maturity between plants of these so-called "garden" varieties and those of the "field" varieties; the former reach maturity, on the average, in fully 20 per cent. less time than the latter. The garden varieties are generally matured about 15 weeks from the date of sowing, whereas the field varieties seldom reach maturity within from 18 to 20 weeks from the date of sowing. These differences in growth are due entirely to the differences in cultivation; the so-called "garden" varieties, being always watered during growth, have, from long habit, become rapid growers.

129. The cotton crop stands the next highest as regards area. The following statement shows the land under cotton during each of the past 22 years:

	1853-54.	1854-55.	1855-56.	1856-57.	1857-58.	1858-59.	1859-60.	1860-61.	1861-62.	1862-63.	1863-64.
	<i>Acres.</i>	<i>Acres.</i>	<i>Acres.</i>	<i>Acres.</i>	<i>Acres.</i>	<i>Acres.</i>	<i>Acres.</i>	<i>Acres.</i>	<i>Acres.</i>	<i>Acres.</i>	<i>Acres.</i>
Cotton	113,919	115,527	135,920	91,053	113,663	131,711	120,086	132,233	88,910	132,684	207,646
	1864-65.	1865-66.	1866-67.	1867-68.	1868-69.	1869-70.	1870-71.	1871-72.	1872-73.	1873-74.	1874-75.
	<i>Acres.</i>	<i>Acres.</i>	<i>Acres.</i>	<i>Acres.</i>	<i>Acres.</i>	<i>Acres.</i>	<i>Acres.</i>	<i>Acres.</i>	<i>Acres.</i>	<i>Acres.</i>	<i>Acres.</i>
Cotton	137,856	110,635	115,529	119,247	117,680	121,288	142,118	142,237	178,660	195,307	193,464

130. The annual production of cotton lint in Coimbatore is estimated to be about 22,000 bales of 400 lbs. each. The consumption of cotton within the district is estimated at 5,000 bales, leaving about 17,000 bales for export. The cotton produced is chiefly sent to Beypore for shipment.

131. Very little cotton is grown in the northern and western portions of the district. The largest area is grown in the taluqs of Erode and Darapuram.

132. The black and red soils are usually preferred for cotton cultivation, probably because these soils are capable of taking up and holding a large quantity of atmospheric moisture, which enables plants growing upon them to survive the effects of a long drought. Clear, dry, hot weather must be secured for the cotton harvest, in order to obtain a good yield of lint, both as regards quality and quantity. The weather experienced in Coimbatore during the months of January, February, and March is particularly favourable for the cotton harvest; but, from its extreme dryness, plants growing on soils, approaching in composition sandy soils, die off; hence, in order to secure his cotton harvest in this dry weather, the ryot is compelled to sow cotton on moderately retentive soils. Mr. Schiffmayer's experiments, at the Sydapet Experimental Farm, show that a black cotton soil is capable of holding more than one-third of its entire weight of water; and that it has, in a very remarkable degree, the power of absorbing moisture from the air; he found in an ordinary cotton soil 9.43 per cent. of moisture, and, in one of sandy soils of the Experimental Farm, only $\frac{1}{2}$ per cent. of moisture, after both soils had been equally air-dried; and, he found further, that the air-dried samples, on exposure to the atmosphere during night, absorbed, the black soil $1\frac{1}{2}$ per cent. of moisture, and the sandy soil only $\frac{1}{2}$ per cent.

133. In portions of the district watered partially by the rains of both monsoons, I am inclined to think that the calcareous soils will, under the rude agricultural practice of the district, yield heavier crops of cotton than the soils on which it is usually grown. The celebrated crop, grown by a former Collector of Coimbatore, Mr. Wroughton, which, on 60 acres of land, yielded 25,000 lbs. of seed cotton, was produced on a calcareous soil resting on a crystalline limestone. Mr. Wroughton attributed the large crop to the effects of the favourable rains, and the land secured from its position directly opposite the Paulghaut gap, and therefore securing the benefits of the rains of both monsoons. I had an opportunity of inspecting this land, and would attribute the large crop to the quantity of lime the soil contains, quite as much as to the favourable climatical conditions of the neighbourhood. However, calcareous soils are not met with to any great extent, and such soils if situated in the drier parts would not be likely to produce good crops of cotton, unless aided by irrigation water. Both the black and red soils would, I am sure, yield very much larger crops of cotton if manured with lime. It is true that some of the black soil contains nodules of limestone, but the action of lime in this form is exceedingly slow and very limited, in comparison with the action of lime that has been prepared by burning.

134. Cotton is sown generally in the months of September and October, and the crops are gathered during January, March, and April; those I saw were very poor indeed; the people said that an average crop was from 200 to 250 lbs. of seed-cotton, which gave from 50 to 60 lbs. of clean lint. I certainly saw no crop that seemed likely to produce more than 70 or 80 lbs. of clean lint per acre, and I saw considerable areas of land under cotton, from which it seemed to me probable that the yield of clean lint would not be 50 lbs. per acre.

135. Coimbatore cotton is noted for its whiteness, but its staple is very short. I learn that there are yet traces in the cotton from some portions of the district of the Bourbon and New Orleans varieties that were introduced by the Government Cotton Farms upwards of 30 years ago. However, the traces are but slight; which, perhaps, is not surprising, seeing how cotton culture is conducted by the ryots.

136. Cotton is grown year after year on the same land. Cotton land is never manured, and, not only is the seed and lint removed, but also the whole of the plant. The cotton seed is given as payment for cleaning the cotton, or it is sold; it is rare, indeed, that it is used for feeding the cattle attached to the land on which it was raised. Much of the seed is consumed by the cattle employed on the roads, chiefly by those employed in connection with the Neilgherry traffic, and a considerable quantity of the seed is sent to the Neilgherries.

137. Cotton

137. Cotton cultivation appears to be very unpopular. I was frequently informed by ryots that they look upon cotton as a *very unprofitable crop*. That this should be so is not surprising if, as is generally stated, the yield of clean lint throughout this district is on the average less than 50 lbs. per acre, for the 50 lbs. would not be worth more, in an average season, than 10 rupees; and it must be remembered that, unlike the majority of the crops grown by the ryot, the cotton crop yields no fodder for cattle, while it is an expensive crop to harvest. I inquired frequently from the ryots why, if the cotton crop paid so badly, they occupied their good soils with it to such a large extent; their general reply was that they grew the cotton in order that with it they might pay the assessment on their land. I asked why they could not grow grain, which would give a larger money return on land of the quality required by cotton. In reply, they said that if they grew nothing but grain, they would have nothing wherewith to pay Government rent, as they and their families could and would consume the whole produce of the land, they having to content themselves at present with only two meals of food per day instead of three; that, as they could not eat cotton, it was therefore available with which to raise money for paying their rent. They asserted that most of the ryots who hold less than 10 acres of dry land, could consume in their own families all the grain their land produced. I asked how men who grew no cotton whatever managed to live and pay their annual rents. To this they replied that men who had no cotton land frequently had wells, and with the aid of the well-water, they grew tobacco, chillies, &c., and by the sale of which they raised money to pay the rent; and where there were no wells, the cultivators bred cattle for sale, from the proceeds of which they obtained money to pay the rent. There is, I think, a good deal of truth in this; however, it should be remembered that under the system of barter practised, the ryot can with grain procure everything he needs as readily as if he had the money the grain represented; hence his domestic demand for grain may be much larger than would suffice for the actual food of his household. In the open market, cotton is as easily bartered away; but for the every-day wants of the family, cotton is not nearly so acceptable an exchange as grain.

138. On an ordinary holding of 10 acres of unirrigated land, farmed in the usual way, the crop would not yield more than 1,500 Madras measures of grain in the year, which, deducting 10 per cent. for waste, &c., would represent an allowance during a year, of about $3\frac{1}{2}$ measures per day. In the Coimbatore gaol, the food allowed to each male adult consists daily of—

	Ounces.
Cholum	24
Dholi	2
Mutton	5
Vegetable	6
Salt and condiment	5
Total Daily	42

The total allowance of food is 42 ounces, but it must be remembered that the grain is without husk, adding this, the total daily allowance amounts to fully 46 ounces, which would be about the weight of $1\frac{1}{2}$ measures of cholum or 46 ounces, which would not contain so much nutriment as the good allowance; in bamboo, which would not contain so much nutriment as the good allowance; in a family of two adults and four children fed on cholum or bamboo, the daily consumption at $1\frac{1}{2}$ measures for an adult male, and four-fifths of a measure for an adult female, would be for the parents two measures and about $1\frac{1}{2}$ measures for the children; total daily consumption $3\frac{1}{2}$ measures. From this it would appear that the produce of the 10 acres would be just sufficient to feed the family throughout the year, and leave a trifle for bartering for clothes, &c. If the members of the family were as well fed as the convicts usually are, and in that case there would be nothing available for the payment of rent, &c. Hence the necessity for restricting the diet to two meals in the day, and in this way saving free one-third of the money value of a full diet for the payment of rent and the other charges which even the humblest ryot has to make. It will be seen thus, that there are good grounds for believing the statement made by the ryots, noticed in the preceding paragraph.

139. Cotton might be produced to any extent in the district of Coimbatore; the climate is admirably suited for cotton culture, and there are large areas of land which would produce it heavily under good farming.

140. The

140. The next important crops are the pulses, Horse-gram (*dolichos uniflorus*), Mutchehcottay (*Lablab vulgaris*), Bengal gram (*cicer arietinum*), Black gram (*phaseolus roxburghii*), Green gram (*phaseolus mungo*), Dhol (*cajanus indicus*). Together these pulses occupy annually about 220,000 acres of land. Horse-gram is the most important; it occupies about three-fourths of the entire area under pulses. Horse-gram is grown to some extent in all the taluqs, but chiefly in those of Pulladum and Coimbatore. There is a large demand for this pulse for the hill markets. Mutchehcottay occupies the next highest area, about 25,000 acres; it is grown chiefly in the taluq of Darapuram. The area under the other pulses referred to, is in each instance about 10,000 acres annually.

141. The cereal crops Shamay (*panicum miliare*) Tenney (*panicum italicum*), and Varagoo (*panicum miliaceum*) are grown to some extent. Together they occupy, in the year, about 150,000 acres. Shamay is grown in all the taluqs, but chiefly in those of Coimbatore and Pulladum. The cultivation of Tenney is confined almost entirely to the Coimbatore taluq, and that taluq also produces the largest area of Varagoo.

142. The area annually under crops that produce seed yielding oil, is about 80,000 acres. The varieties chiefly grown are Gingelly and Castor, the former occupies about 55,000 acres, and the latter about 25,000.

143. Several other crops are grown on the unirrigated arable land; but from the small area they occupy, they are not of much importance.

144. An exceedingly small proportion of the occupied area is under grass. I saw some fair pasture near Othikkalmundapum in the Coimbatore taluk, and also a few patches of middling pasture in the Pollachy and Kongiem taluqs; but elsewhere in the district, excepting on the slopes of the Annamalais and Neilgherries, on the banks of the larger rivers, and on the margins of irrigated land, I saw nothing that could be called "grass land." Over the greater part of the country, there is not in each 1,000 acres of occupied land, more than one acre under pasture.

145. The almost entire absence of pasture land is a serious defect in the agriculture of this district. The temporarily abandoned arable land is recognised as "grass land" in the revenue classification; this is, I think, a grave error, for it is calculated seriously to mislead. In all countries "grass land" is understood to be land which is covered by grass, either throughout the whole year, or during a considerable portion of the year. Now much of the so-called grass land in the district is altogether without grass, being almost as bare as the highway. A country which has a large area of grass land, is in a much safer condition than a country in which all the land is under arable husbandry.

146. We are told that "grass land" occupies, at the least, 10 per cent. of the occupied land of this district; such a statement does no harm when it is understood that this so-called "grass land" may be land which is altogether destitute of grass, but, without this special knowledge, the statement is certainly misleading. I saw a good deal of this so-called "grass land," and much of it would not, I am sure, yield a barrowful of grass, roots and plants included, per acre. The season had certainly been an unusually dry one; however, this would not account for the poverty of vegetation on the land.

147. In some instances land is specially set apart by the ryot for the production of grass. I saw some of this land which had been so reserved for periods varying from 10 to 30 years, and in no instance did I see anything approaching a sward. In most instances the grass grew in low tufts, which were scattered over the ground at distances of from six to 12 inches, the intervening spaces being quite bare. The grasses seemed generally to be perennial species; I seldom saw annual grasses or other annual plants growing amongst these grasses. I saw one piece of pasture-land which had been under grass for more than 30 years, and I am quite certain that if the whole of the produce on the land was scraped off, it would not have amounted to 200 lbs. per acre.

148. The ryot never manures his pasture-land, and he crops it incessantly with cattle, sheep, and goats as long as these animals can obtain a scanty support on it. The only time when this pasture-land is allowed rest is during and after heavy rain, when the grass which then springs up is considered to be

noxious

noxious to live stock. The grasses are thus never permitted to produce seed, or only to a very limited extent, and hence much of the ground remains bare.

149. Ryots know nothing whatever about raising grasses from seed. When pasturage is desired, a piece of arable ground is left untilled, and in the course of a few years it becomes covered here and there with scanty tufts of herbage. No attempts are ever made, by planting the roots of grasses, or by sowing the seeds of grasses, to improve this scanty pasturage.

150. Not only are the circumstances bad under which land is laid down to grass, but the whole of the subsequent management of the grass is the very opposite of that under which good results might be achieved. Land when once covered by a scanty pasturage, such as I have described, is abandoned, as far as acts of husbandry are concerned.

151. The consequence of this mismanagement of the grass lands is a serious deterioration in the live stock. It would be impossible that anything else but deterioration could result to live stock raised on these exhausted grass lands; if the grass does not in itself afford the food required by the stock during growth, and the special food required is not supplied by other means, the result must be an animal of stunted and imperfect form. Ryots speak with pride of a period 20 or 30 years ago, when they possessed fine breeds of cattle and horses, the loss of which they attribute to the almost total disappearance of grass in the cropping of the district.

152. Ryots complained bitterly about a change in the assessment of land, made some years ago, under which most of their best grass lands were brought under the plough. I have not been able to procure any exact data, but the assertion generally made was, that before the change in question took place ryots were permitted to hold grass land at one-fourth of the rent paid for tilled land, without fear of any one taking the land from them. I understand, from information afforded me by the Board of Revenue, in their Proceedings, No. 3044, of the 2nd December 1876, that ryots are still permitted to hold the so-called "grass land" at one-fourth the annual rent payable for their arable land, provided no person is willing to take up the land for arable culture at the full rent. The effect of these rules is to restrict grass to such soils as are not, in the estimation of the ryot, competent under arable culture to afford even that wretched return with which he is usually satisfied, and to induce the breaking up of grass land whenever its condition is such as to promise a good return under tillage. Under circumstances such as these, it is not surprising that good pasturage should be unknown.

153. To produce a good pasture is a difficulty even in England, where the climate is all that could be desired for the growth of grass. In that country, the soil intended to be laid down under pasture is prepared in a most elaborate way: seeds of the varieties of grasses likely to succeed best on the special soils to be sown are selected, and are sown under conditions calculated to secure good results, the soil being previously put into a good manural condition. In the after-management the greatest care is exercised.

154. In Great Britain much money is expended on labour and manure, under careful management, in the laying down of land under grass. There is perhaps no work of the farmer which demands to be more thoroughly performed than that connected with the laying down of land under grass for pasture; and yet, in this country, with its unpropitious climate, the production of pasturage is supposed to demand nothing from the ryot, but to result from natural agencies, which are not one-hundredth part so powerful for good in the direction required than are such agencies in England.

155. Such pastures as we have in England could not be produced in Coimbatore on the unirrigated land, but moderately good pastures could be produced by the ryot if he adopted a better system of husbandry.

156. On the land watered by wells, there would be no difficulty whatever in producing good pasturage; there are many grasses well suited for cultivation under such condition as could be afforded. If the ryot could be induced to lay down under grass annually a portion of his land irrigated from wells, and to graze this land by his live stock, the soil would be improved for the next

next two or three succeeding crops, and on the removal of these the land might again be put under grass; or some of the vast volume of water wasted on the paddy crop might be diverted to land on which grass might be produced. The extraordinary crops of grass produced in the neighbourhood of Madras under occasional irrigation shows what can be done in this direction.

157. Throughout the district, the ryots agreed in stating that the unirrigated land has diminished in productiveness fully 30 per cent. during the past 25 years. Many of the men whom I consulted possessed river-irrigated land, as well as unirrigated land, and as these men without an exception, stated most positively that there was no change whatever in the productiveness of the river-irrigated land during the period in question, we may, I think, accept their testimony as true, especially as everything tends to support its truthfulness.

158. I took special pains to sift statements made regarding the deterioration in the fertility of the land, and I could come to no other conclusion but that *this deterioration has taken place, and to a very alarming extent*; while it appeared to me equally certain that the influences which have brought about this result are not only still in operation, but are now operating in a much more intensified form.

159. I have before pointed out that the large area of land which, previously to 1855, was untilled, was the reserve which enabled the ryots to treat their arable land in a somewhat better way than is now the usual practice, chiefly by enabling them to keep more stock.

160. Everywhere where I went the ryots declared that there has been a great diminution in the live stock of the district. Since returning to Madras, I have carefully examined the statistics of Coimbatore, and I have ascertained that *in the last 30 years the area under occupation has been increased 50 per cent., while there has been but little change in the number of live stock*; hence, compared with the area of land now under occupation, there has been a large decrease. The following statement shows this:—

Official Year.	Number of Ploughs.	Area of Occupied Land.	Number of Head of Cattle.	Number of Head of Cattle per 100 Acres of Occupied Land.
1838-39	71,381	990,334	657,766	65.81
1839-40	73,193	1,024,702	658,264	64.24
1840-41	74,540	1,043,660	654,254	62.69
1841-42	77,758	1,088,612	644,777	59.23
1842-43	79,485	1,112,790	656,369	58.98
1843-44	80,314	1,124,396	659,935	58.69
1844-45	81,918	1,146,852	661,783	57.70
1845-46	83,916	1,174,824	633,726	53.94
1846-47	84,362	1,181,068	628,799	53.24
1847-48	85,531	1,197,434	633,956	52.94
1848-49	86,716	1,214,024	641,737	52.86
1849-50	87,103	1,219,442	655,456	53.75
1850-51	88,055	1,232,770	697,666	56.59
1851-52	88,598	1,240,372	726,102	58.55
1852-53	—	—	—	—
1853-54	—	—	—	—
1854-55	—	—	—	—
1855-56	—	—	—	—
1856-57	—	—	—	—
1857-58	* 105,339	1,474,746	494,445	32.85
1858-59	—	—	—	—
1859-60	—	—	—	—
1860-61	—	—	—	—
1861-62	* 124,421	1,741,894	628,035	36.11
1862-63	—	—	—	—
1863-64	—	—	—	—
1864-65	—	—	—	—
1865-66	—	—	—	—
1866-67	* 147,239	2,062,046	675,340	32.75
1867-68	—	—	—	—
1868-69	—	—	—	—
1869-70	—	—	—	—
1870-71	—	—	—	—
1871-72	* 173,011	2,422,164	773,663	31.94

Now counted only every fifth year.

I was unable to procure the area under occupation, in each of the years, for the whole of the period to which the statement refers; but, as I possessed statistics giving the number of ploughs, in most of the years in question, I have been able, to some extent, to supply this deficiency. By multiplying the number of ploughs in each year by 14, I obtained the area of occupied land. It will be seen from the following that each plough represents 14 acres of occupied land:—

Official Year.	Actual Area under Occupation.	Actual Number of Ploughs.	Area under Occupation for each Plough.	Average Number of Acres for each Plough.
	Acres.		Acres.	
1861-62	1,776,971	124,421	14.2	14.1
1866-67	2,199,089	147,239	14.9	
1871-72	2,293,926	173,011	13.2	

The number of cattle was determined by adding, in each year, to the actual number of cattle, one-eighth of the number of sheep (eight sheep being estimated as equal to one head of cattle). It will be seen that *in the official year 1838-39 there were, for each 100 acres of occupied land, 66 head of cattle, whereas in 1871-72 there were only 32 for the same area*. It must be remembered that the average live weight of one of the cattle referred to is not more than 350 lbs., which is only the weight of an average sized Cotswold sheep.

161. I must again point out that I do not look upon the increased area of arable land as an evil in itself, but it is undoubtedly a great evil under the circumstances I have mentioned. As long as the arable land consisted only of the more fertile portions of the country, and as long as that arable land was to a great extent supported by the manure of cattle, fed in the untilled portions of the district, so long were the ryots able to support themselves by their rude agricultural practice. It is clear, that if the arable land did not receive fair treatment as regards manure when there were 66 head of cattle for each 100 acre of occupied land, it cannot receive justice now, when for each 100 acres, the number of cattle is only 32. But not only has the manuring force, as represented by cattle manure, diminished to one-half, but even of that, not more than 50 per cent. is now available as manure, from the great increase in the use of cattle dung as fuel, since the clearing of the jungles. The consumption of cattle dung as fuel is now very large. In many native households in towns, fully one-third of the fuel used is cattle dung. From information I have been favoured with, it would appear that, in Madras, the consumption of cattle dung bratties amounts to about 100 per mensem for each adult in many middle-class native households. In a family consisting of seven adults and four children, 800 bratties are used as fuel in a month; in another family consisting of three adults, the monthly consumption is 400 bratties; in another household, consisting of three adults and three children, the consumption of this fuel is 400 bratties per mensem; in another, consisting of four adults and two children, the monthly consumption is 400 bratties; in another, consisting of two adults and six children, the consumption is 450 bratties per mensem; and in another household consisting of two adults, the consumption is 300 bratties monthly. The dung of one average sized bullock would, in a month, collected during the night only, make about 120 bratties. During the dry season an average sized plough bullock, and an average sized cow, yielded at night in a month a quantity of dung that made, in the first instance, 90 bratties, and in the second, 120; and during some experiments made on the Sydapet Experimental Farm, with the large bullocks used there, it was found that the dung of two bullocks in two months made 734 bratties, which was equal to 183 per head per month. It would, therefore, appear that, in many native households, the consumption of cattle dung as fuel is equal to that obtained from one bullock for each adult forming the household. It is true that this quantity of dung cannot be used in all households, for the cattle in the country would not nearly suffice to meet such a demand. However, the facts show to what a large extent cattle dung fuel

fuel is used. As fuel is as costly in most parts of Coimbatore as it is in Madras and as the habits of the people are similar, there cannot be a very great difference in the quantity of cattle dung used; if there is a difference, the probability is that the consumption of cattle dung is greater in Coimbatore from its being more accessible to the people.

162. Few people have any idea of the enormous consumption of fuel in our rural districts. I was informed at one small town that its population, under 7,000, used monthly 4,000 bundles of 50 lbs. each of jungle fuel, which is equivalent to upwards of 1,000 tons per annum, or the produce of at least 100 acres of well-grown scrub jungle; besides the jungle fuel referred to, the inhabitants of this town used a large quantity of cattle dung, the stems of cotton plant, &c. These figures show that the average monthly consumption of jungle fuel per inhabitant of the town is 28 lbs.; in the Coimbatore gaol the monthly consumption of fuel per prisoner is 60 lbs.

163. As a general rule, ryots do not readily admit, when asked for the first time, that they do not use manure; it is only after a judicious cross-examination that the fact that they do not use it, excepting to a very limited extent, is brought to light, thus:—

Do you use manure?—Yes.

What sorts of manures do you use?—Sheep manure and cattle manure.

Do you use any other kinds of manure?—No; excepting occasionally a small quantity of village sweepings, and, for wet land, Kolinjy and Auvaray leaves.

How many acres do you hold?—Forty.

Is it all arable land?—Yes; all ploughed.

How many sheep and how many head of cattle have you?—Twenty sheep and six head of cattle.

Do you use cattle dung as fuel?—Yes.

What proportion of the cattle dung do you use as fuel?—About half.

How do you manure your land with the dung of the sheep and cattle?—We generally fold the sheep and cattle on the land in pens at night.

Are the whole of your sheep and cattle kept in one fold?—The sheep are all in one fold, and the cattle are generally tethered to the fold on the outer side.

Do you give your sheep and cattle any special food when folded on the land?—Not the sheep, but the cattle get a little cumboo or cholum straw.

What size is your fold?—Seven yards square.

The cattle, I observe, are tied outside of the fold; is this always the case?—Yes, generally.

Then, the area manured by the cattle tied outside of the fold, and by the sheep within the fold, must be equal to about 100 square yards, which will represent the area manured between each time the fold is removed?—Yes.

How often do you remove your fold?—Every second day.

Then, it is evident that you will manure only 100 square yards of land in two days, or, in a month, 1,500 square yards, or in a year, less than four acres. How do you manure the remainder of your land?—We cannot manure it, it goes without manure.

But you said that you manured your land, whereas the fact appears that nine-tenths of it is unmanured. How do you explain this?—I have eight acres of garden land, and this gets the whole of the manure. I never manure dry land. Dry land is never manured unless when the cultivator only has dry land, in which case his dry land gets what manure he has.

Then you mean to assert that dry land is never manured except under the exceptional circumstances you have mentioned?—Yes. All the manure goes to the garden land; the dry land is cultivated without manure.

The foregoing is compiled from notes taken at conversations held with ryots, and is representative of many.

164. It was only by putting fact with fact that I was able to come to any conclusion on many of the questions that presented themselves during my investigations. After having ascertained the number and description of stock kept in or at a fold, the number of these folds on a holding, the area manured between each removal of the fold, and how long the fold remained in one place, it became a very easy matter to calculate how much land could be manured in the year on the holding.

165. I measured many sheep-folds; the majority of them covered an area of only 50 square yards, and, on the average, they contained 20 sheep and goats of all ages; in addition to the animals inside the fold there were, on the average, three head of cattle tethered on the outer side.

166. The

166. The sheep of the district are used almost entirely for manuring purposes. There were in 1871–72, 850,227 head of sheep and goats; dividing these in pens of 20 each, 42,511 would be required; the animals at each pen, inside and outside, would together manure 100 square yards of ground; we must therefore multiply the number of pens by 100, which gives 4,251,100 square yards or 878 acres as the area manured in two days, assuming that, on the average, each pen is moved every second day. From these calculations it would appear that if folding was practised universally throughout the district on the arable land, only 158,000 acres of land could be manured in the year, and that to do this the whole of the sheep and goats and one-fourth of the cattle would be required. Making every allowance for the dung of the remainder of the cattle stock available as manure, and deducting the manure lost at the seasons of the year when folding is unadvisable or impossible, it is clear that the ryot cannot manure in the year more than 200,000 acres of land by the dung of sheep and cattle. Assuming that the efficacy of the manuring obtained from folding operates during two years, there will be altogether not more than 400,000 acres benefiting from the manure of sheep and cattle, leaving more than one and three-quarter million acres of the unoccupied land altogether unaided by manure; thus 75 per cent., at the least, of the occupied land is never influenced by manure. It must not be supposed that the 25 per cent., except the portion irrigated from rivers, is manured in a satisfactory way; the foregoing calculations take no cognizance of the quality of the manuring, they show only the area that can be manured under the practice generally followed in folding. I have already directed attention to the imperfections of the folding system.

167. The ryot of Coimbatore knows nothing whatever of the use of mineral manures. The soils greatly need lime, potash, and nitric acid, yet these plant foods are never directly applied to the soil by the ryot, even though lime and saltpetre are available at prices sufficiently low to justify their use; indeed, so moderate is the price of saltpetre that it is being largely exported for use as a manure agent; if it pays the British and continental farmer to use Indian saltpetre as a manure, surely it would pay the Coimbatore farmer to use it to some extent, at any rate, in the production of those more valuable crops, tobacco, sugar-cane, wheat, &c., which feed so largely upon potash and nitric acid, and which are now grown to such a very limited extent, not from any fault in the soil, but from the general neglect of manuring. It is true that the ryot cannot afford to use these expensive manures in raising crops of the inferior cereals, but in the cultivation of the crops I have mentioned he can well afford to use them.

LIVE STOCK.

168. I did not see a good specimen of either a country-bred horse or pony in the whole district, away from the neighbourhood of large towns. From what I had heard I was led to expect that in the Kongiem taluq, at any rate, I would see some fair specimens of country-bred horses and ponies, but even in the Kongiem taluq I did not see a country-bred horse or pony that would, at a Madras auction, sell for 50 rupees, and I am sure that the majority of those I saw would have been dear at only half this price. In all my experience I never saw together such a number of under-sized wretched-formed brutes as I saw at the Kongiem fair. The average jutka pony of Madras is quite equal to the best of the country-bred ponies of the district that came under my observation. In the Southern taluqs under-sized horses or large ponies are used for riding, these, generally, are about 13 hands in height, and are flat-sided, narrow-chested, long-legged animals; nearly every one had crooked deformed legs. Yet I was informed by many ryots that at one time Coimbatore bred some really good horses, with which the army was supplied; indeed, it is on record in the proceedings of Government that, even as recent as 30 years ago, the district possessed many really good horses. The ryots attribute the decline of horse-breeding during the last quarter of a century, first, to the want of good grazing, so much of the grass-land having been broken up, and the soil under grass being now so unproductive from insufficient rainfall, and

and from the discouragement to local breeding by the army now being supplied almost entirely with horses imported from other countries.

169. Government have, at different times, endeavoured to improve horse-breeding in Coimbatore. In 1831 they sent from Oosoor four stallions to travel through the districts; and, from that year up to 1847, the district was seldom without any Government stallions. Recently two stallions, a horse and a pony, were placed at the services of the horse breeders, but the results of the experiment have not been deemed satisfactory. My own impression is that it will be of but little use to place well-bred stallions at the services of horse breeders of this district until the agricultural practice generally has been very materially improved. There is but little natural pasturage suitable for raising horses, excepting on the slopes of the Annamalais and Neilgherries, and the pastures there are unfitted for grazing horses, from the rough irregular surface of the ground.

170. Horse-breeding can be conducted successfully in this district only when proper crops are raised for the use of horses. The climate of some parts seems suited for horse-breeding, and over a considerable portion there would be no difficulty whatever in growing lucerne and other green crops as fodder for horses, while good pasturage could be provided if proper means were taken.

171. Until a decided change for the better has taken place in the agricultural practice of the ryot, mule-breeding would, I think, be attended with much more success than horse-breeding. Of course the mares would need to be maintained in good condition, whether they are used for horse-breeding or for mule breeding, but the stallion asses would be maintained at a much less expense than entire horses, and the young mule would thrive under conditions that would prove highly detrimental to young horses. If mules could be produced, at a moderate price, they would be in great demand, not only for use on the Neilgherries, for coffee estates and for the passenger traffic, but also on the plains. The mares that I saw in Coimbatore were certainly not such as would produce good mules, but they would produce better mules than horses. If Government action is necessary, it would, I think, be attended with more success if brought to bear in the direction of mule-breeding than of horse-breeding, under the present condition of agriculture in the district.

172. The best cattle are found in the Kongiem, Sattiamangalam, and Polla taluqs. The cattle of the northern portion of the district resemble very much the Mysore breed, excepting as regards size. In the southern portion of the district the cattle more nearly resemble the Kongiem breed. The best cattle are generally owned by carters employed on road traffic, more especially in connection with that of the Neilgherries. It was very seldom indeed that I saw any good cattle on ryots' holdings. I was much disappointed during my tour in the Kongiem taluq, with the cattle that came under my notice there; from what I had heard of the Kongiem breed, I had expected to see some good stock in the taluq from which the breed had taken its name, but throughout the taluq the cattle are now in no respect better than are those of the neighbouring taluqs. At the Kongiem fair I saw congregated together several hundred head of cattle, and amongst these, excluding those belonging to carters, there was not perhaps a dozen animals that in Madras would sell for 40 rupees per head, but even these afforded evidence of the qualities of the breed, though now so greatly degenerated. In the carts on the road between Caroor and Kongiem I frequently saw some very well-shaped cattle, which were said to possess most of the points of the Kongiem breed. These animals were low-set, square, deep-framed and broad-loined. In colour they were generally red, but I saw some of all the usual cattle colours. For light draught, either on the road or in the field, the cattle of this breed appear to be well adapted, and they are active and hardy.

173. It would be a great loss to the agriculture of this country if the Kongiem breed of cattle should be allowed to become extinct. The Kongiem ryots who formerly bred cattle, said that they had ceased breeding them from the impossibility now of rearing moderately good animals, except by feeding with grain, and this they could not afford to do. They informed me that during the

past 10 or twelve years the breed of cattle for which their taluq was formerly so famous, has been gradually disappearing. They said that this was due to the smaller area of grass land, to the unproductiveness of grass lands during the past few years from the deficient rainfall, and to so many of the best breeding animals having been sold, the breeders being too poor to keep them. So low has cattle-breeding sunk in this taluq, from the causes above mentioned, that instead of, as formerly, supplying the neighbouring taluqs with cattle, Kongiem now obtains most of the cattle required for its own tillage operations from Sattiamangalam and the adjoining taluqs. The under-sized bullock of Southern India is gradually displacing, even in Kongiem itself, the once famous Kongiem breed; the ryots find that they can buy these inferior animals at from eight to 12 rupees per head, whereas, under present conditions, they could not breed and rear a bullock at twice the sum, seeing that the grazing would need to be supplemented by an allowance of grain. Unfortunately many of the ryots seem to consider it better policy to buy a pair of these ordinary under-sized plough-cattle, at say 20 rupees, rather than to expend 20 rupees in breeding and rearing a bullock of the Kongiem breed. All they appear to see is, that they can purchase two cattle for the sum that it would cost to breed and rear one; they do not seem to appreciate the saving in cattle-food and in labourer's wages, when one pair of cattle does the work of two pairs.

174. In the parts of Kongiem where cattle are yet bred, they are reared on such grass as they can meet with, aided with an occasional allowance of straw; but during the two or three months before it is intended to offer the animals for sale, they receive daily a small allowance of grain, or, in the case of the poorer cultivators, a small daily allowance of the meal of acacia seed. No crops are reared specially for cattle, either in Kongiem or in other parts of Coimbatore.

175. I attended several cattle markets during my tour; in some of these I found bullocks four or five years old being offered at from seven to 10 rupees per head. The fact that a bullock after four or five years' rearing, will sell at only from seven to 10 rupees, shows how small is the return from cattle breeding when managed in the ordinary way by ryots. I was told by several of the ryots who had bred cattle, that for a bullock of the ordinary low country breed, five or six years old, it was rare that they ever obtained more than 10 rupees per head, and that at this price they were generally losers.

176. In the hot dry season, the cattle on the land skirting the hill ranges are sent to be grazed on the higher slopes, hence, in these localities, the cattle are better than those in other parts. The cattle employed on the roads are much better fed than those employed in ordinary agricultural labour; at the various halting places and in the markets, cholum, both green and dry, was regularly offered for sale for the use of cart-bullocks. If the ryot could be induced to maintain his breeding stock in as good condition as the cart-bullocks, there would be but little to complain of.

177. As a general rule, the cows are half-starved; as a consequence of this mismanagement, but little milk is obtained. During the two months after calving, it is usual to remove only about one-half of the milk, the remainder being left for the calf, but afterwards all is removed except the strippings which the calf is allowed to get. In some places the practice is to allow the calf to get all the milk during the first two months, and half of the milk after-

178. A good cow of the Kongiem breed will give in the height of the grass season when in full milk, one-and-a-half Madras measures, equal to a little more than two quarts daily, but the general average is not more than one measure (three pints daily); even under favourable circumstances, and the cow seldom gives milk for longer than six months after calving.

179. Throughout the district, during the time of my tour, the cattle were affected by foot-and-mouth disease. In all the markets might be seen standing by side, healthy and diseased stock. The ryots appear to attribute but little importance to the foot-and-mouth disease; they said that they only lost calves and sickly animals by it, but admitted that bullocks attacked by the

the disease were always brought into a very low, weak condition, while the cows lost their milk; however, the ryots are so accustomed to see their cattle in low condition, that they take but little account of the effect of the disease when loss of condition is the only result.

180. There are two well-defined varieties of sheep in Coimbatore. Throughout the district generally, the sheep are the long-legged, red-coloured, hairy animals, of a goat-like appearance, common to many parts of Southern India. In the neighbourhood of Coimbatore there is a small variety with white wool, and black faces and legs, these in general appearance resemble very much diminutive South Downs.

181. The reddish-coloured sheep are said to yield good mutton; when in good condition, an average sized sheep will yield about 25 pounds. When fit for killing, these sheep sell for from two to three rupees per head. They are seldom kept in large flocks, but most of the ryots own a few which they fold on their land.

182. The white-wool breed is found chiefly in the Coimbatore taluq. Sheep of this breed are nearly always owned by persons who depend solely for a livelihood on the income the sheep bring in, when used for manuring land. Generally these sheep are in large flocks. They yield a short white wool, which, though of only an indifferent quality, meets with a ready local demand for manufacture into cumblies and blankets, which are largely used by the tribes inhabiting the hills bordering the district. The yield of wool is seldom more than 1 lb. per head, hence the flock owners attach but very little importance to it; neither do they attach any importance to the mutton-producing capabilities of the breed. The sheep are kept as manure producers, and it is from their employment in this way that their owners derive their income. The flocks are moved about from one holding to another wherever there is a demand for their services, a fixed rate per night being paid in grain for each 100 sheep, by the person on whose land the sheep are folded. In some cases, the flock owner is paid as much as eight measures of grain per 100 sheep per night. The land when folded is generally quite bare; no food is provided for the use of the sheep while folded; during the day-time they are allowed to graze in the adjacent country on whatever wild vegetation they may find, on road-sides, and on the marginal divisions of cultivated land. The mutton of this white-wool breed does not appear to be much esteemed in the district. When full-grown, the carcass weight of one of these sheep is not more than 20 lbs.

183. The flocks generally are composed of sheep of all ages and of both sexes. No attempt appears to be made to separate the sexes, or to select the breeding animals.

184. Government have made several efforts to improve the sheep stock of this district. As far back as 1839, 30 half-bred Merino rams were distributed amongst the influential ryots and cattle-breeders, but the whole of the sheep appear to have died without producing any good result. In 1842, 20 half-bred and two pure-bred Merino rams were supplied to the district, and the collector, Mr. Wroughton, kept them under his own charge instead of distributing them. These rams he placed with a flock composed of 150 country ewes, but this experiment also appears to have failed. In 1850, 50 half-bred Merino rams were received in the district from the Mysore sheep farm; of these, 20 were given to respectable and well-to-do ryots who were thought likely to make a good use of the sheep, the remaining 30 were kept under the charge of the collector. This experiment is also said to have failed; the failure was attributed to the delicate constitution of the sheep, and to the want of care in their treatment.

185. The wool produced by the half-bred Merino sheep introduced into Coimbatore, appears to have been very much superior to anything yielded by the indigenous breeds of sheep. The only records available on these experiments, afford little or nothing by the aid of which an opinion can be formed as to the real causes of the repeated failures, further than that the sheep were subjected to a great deal of mismanagement.

186. A number of Mysore ewes, which had been exported to the Cape, produced with Merino rams there, a most excellent cross, the wool of which commanded

manded a very high price. And in Mysore the Merino rams produced with the indigenous ewes very fair results.

THE RYOT.

187. The cultivators occupying unirrigated land are generally very poor; the majority of them are deeply in debt. They attribute their poverty to a succession of bad seasons, and to their land having become less and less productive. I pointed out, at several of the ryot gatherings, that though the produce of the land might now be much less than the produce obtained 20 years ago, the greatly increased value of that produce far more than compensates the cultivator for the diminished crops. They admitted that there had been a great increase in the value of agricultural produce during the period in question, but contended that this increase in the value of such produce was against the cultivator rather than in his favour, because of the largely increased demand for food in his family. On asking for an explanation regarding this statement, the people said that their families now consisted generally of from four to five children, whereas 20 years ago three to four children was the average number in a family. They appear to look upon this larger demand for food in their families as a serious drawback to their prosperity, for instead of the higher prices tending to bring in a larger income, they tended only to increase the cost of rearing a family. They attribute the larger number of their families to the reduced death-rate, many more children now surviving to reach adult years than was formerly the case.

188. They declared that many of the holdings did not produce as much grain as would, after paying the Government rent, afford the ryot and the members of his family two meals of food daily throughout the year. They also asserted that the cultivators possessed fewer live stock, and those of a much inferior kind compared with what they formerly possessed, and that therefore their resources in a time of need were less than formerly, the sale of young cattle and sheep having been the chief resource of ryots in times when money was urgently required.

189. The usual rate of interest for money borrowed varies from 18 to 24 per cent. Money is generally advanced to the ryot on the security of the right of occupation of his holding. It is the general practice for the mortgagee, after foreclosing a mortgage, to arrest for any balance of principal and interest remaining unadjusted, after receiving the proceeds of the sale of the right mortgaged; this, I believe, is quite different to the practice followed in England. The right of the mortgagee, after foreclosing and receiving the proceeds of the sale, to prosecute further for any balance still standing in his favour is a highly pernicious one. A man with a holding, the right of occupancy of which would be worth 500 rupees, borrows say 50 rupees under the usual conditions; for some years he is probably not troubled about the payment of the interest, especially if he has some well-to-do relatives; it is only when the interest and principal together amount to about the selling value of the right of occupation that the mortgagee begins to take active steps towards obtaining the settlement of his claim. If his claims are not then settled, he puts up to auction the right of occupation to the holding, takes whatever sum is realised, and then begins a course of persecution in order to obtain the balance. The unfortunate cultivator, who, by this time, has been turned out of his holding, and is compelled to look to field labour as a means of support, is threatened with arrest, or is arrested, if he has friends likely to be able to assist him with money. Until the whole claim is paid off, the unfortunate debtor may be arrested again and again.

190. The man who mortgages the right of occupation of a ryot's holding is to all intents and purposes a pawnbroker, and the transaction should be ruled by pawnbroking regulations. Under the arrangement now in force the policy of the mortgagee, or pawnbroker, with whom the ryot deals, is to keep perfectly quiet about the interest until it, with the principal, has amounted to a sum equal to the saleable value of the right pawned or mortgaged, when the unfortunate debtor is entirely at the mercy of his creditor.

191. It

191. It would certainly be a great boon to the ryot if all his borrowing transactions were governed by the provisions of an Act somewhat similar to the Pawnbroking Act of the United Kingdom. At any rate there should be a limit to the period during which the recovery of a debt of the sort, under reference, can be made; if the Statute of Limitation does include such transactions, the fact does not appear to be known to the ryots, for I was informed of several instances in which, for periods of from five to eight years, no interest had been paid, and in which the mortgagee had enforced his claim for full interest and principal, and in one or two cases had either arrested, or threatened to arrest, for balances due after realising by foreclosing the mortgage.

THE LABOURER.

192. At the last census there were 138,679 male labourers in Coimbatore, of whom three-fourths were engaged in employments connected with land. Of these a considerable number find employment during a portion of the year on the coffee estates in the Neilgherry district.

193. During the cultivating season the agricultural labourer, and such members of his family as are able to earn wages, generally meet with employment but during the other half of the year they experience much difficulty, and have to fall back upon grass-cutting, fuel-collecting, and similar casual employment.

194. It is usual to pay wages in kind; money wages are only paid in an around the larger towns. When the agricultural labourer is engaged by the year, the usual wage is 40 Madras measures per month of grain, cholam, cumaboc or raggy; when so engaged payment is only made when work is actually performed, when sick and unable to work the labourer is not entitled to any allowance of grain. In some localities the yearly labourer is paid 44 measures of grain per month, with an allowance of three rupees in the year; in other localities the monthly wage is only 32 measures of grain without any other allowance. A boy employed by the year is paid 16 measures of grain per month, with an allowance of 12 annas in money in the year. Yearly labourers generally receive from the ryot on hiring an advance of money varying from 10 rupees to 20 rupees. The advance is made generally to enable the labourer to pay the advance he received from his former employer, whose service he could not do without first paying off this advance. On entering first upon service he receive from their employer an advance, and this they are seldom able to pay without taking an advance from another person, and thus re-binding themselves. It is the policy of the employers to discourage attempts on the part of labourers to repay advances. To all intents and purposes these labourers are serfs, for their employers always manage to keep them in their debt. The following frequent inquiries regarding the circumstances of these labourers. The following case may be accepted as a fair illustration:—Veerasawmy is employed as a yearly cooly, under an agreement; he receives monthly 30 measures of grain; his wife, when employed for a whole month, receives 15 measures of grain; his family consists of five children, none of whom are able to work; when sick and unable to work his grain wage ceases; throughout the cropping season his wife works, on the average, 15 days in the month; he loses from sickness about one month in the year; he pays the rent of his hut, buys cloths with the grain he puts aside when both himself and his wife meet with work; he experiences great difficulty in setting aside any grain for such purposes, as, even when both are employed, the quantity received would not suffice to feed themselves and family.

195. The occasional labourer is paid a somewhat higher wage; however, he seldom gets employment out of the cultivating season. Two measures of grain is the usual allowance per day for a man of this class, and one measure per day for a woman. In some localities the occasional labourer is paid only 1½ measures per day. When the occasional labourer cannot meet with agricultural employment, he goes to the jungles and cuts fuel which he takes to the larger towns for sale, or seeks for work on the coffee estates in the Neilgherry district.

OFFICE WORK.

196. The following are a few of the subjects on which advice and information was given, during the past year:—

Presidency, Province, or District from which Advice or Information was asked.	GENERAL NATURE OF SUBJECT.
Travancore	Asking advice regarding the treatment of growing paddy severely attacked by insects.
Mysore	Asking advice regarding the choice of a lift for raising water from a deep well.
Madras	Asking advice regarding the management of a flock of sheep.
Neilgherries	Asking advice regarding the selection of a chaff cutter for use where a large quantity of straw chaff is required daily.
Pondicherry	Asking for information regarding the culture and curing of tobacco.
Ceylon	Asking advice as to the means to be employed for improving native agriculture.
South Arcot	Asking advice regarding the laying down of land under permanent grass.
England	Asking for information regarding the habits of the species of bamboo usually grown in Southern India.
Ganjam	Asking opinion regarding two kinds of indigo seed, from which, in the field, very different results were obtained.
Godavery	Asking for detailed information regarding the cultivation of Carolina paddy.
Travancore	Asking advice regarding the reclamation, for agricultural purposes, of land frequently submerged by the sea.
North West Provinces	Asking for information about water-lifts suited for general use in agriculture.
Wynaad	Asking advice regarding the treatment of certain sick cattle.
Madras	Asking opinion regarding the feeding of horses on Guinea-grass.
Malabar	Asking opinion regarding the manural value of the fern that grows so abundantly in Wynaad and Coorg.
Mysore	Asking advice about the general construction and size of loose boxes for cattle.
Neilgherries	Asking opinion regarding the cultivation of Guinea-grass on land situated at high elevations.
Tubulpoor	Asking advice regarding the cultivation of tea and coffee.
Wynaad	Asking advice regarding the cultivation of wheat.
North West Provinces	Asking advice as to the selection of a plough suited for general agricultural use.
Madras	Asking for information regarding the cultivation of coffee.
Colaba	Asking for advice as to the means to be taken for improving agriculture in Bengal.
Madras	Asking opinion regarding the feeding value of gram, and of a mixture composed of gram and maize, in equal proportions.
Malabar	Asking advice regarding the treatment of land much infested with a grass with long creeping roots.
Mysore	Asking advice regarding the choice of a set of agricultural implements and machines for an arable farm.
Travancore	Asking for advice regarding the culture and curing of tobacco.
Ganjam	Asking for information about waggons and carts, for carrying bulky loads over bad roads.
Tanjore	Asking for a list of agricultural books likely to be of use to an intelligent agriculturist.
Neilgherries	Asking for information as to the description of crops likely to suit for general cultivation on the Neilgherries.
Cuddapah	Asking advice as to the choice of a plough for turning over deeply the black cotton soil of the district.
Madras	Asking for information regarding the cultivation of tobacco.
Karnool	Asking for information regarding water-lifts suited for general agricultural use.
Neilgherries	Asking opinion whether cattle dung should be applied to the soil in the fresh state or after having been decomposed.
Madras	Asking advice regarding the management of poultry.
Neilgherries	Asking opinion regarding the relative value of the manure of lean stock and of that of fattening stock.

197. I had during the past year a large correspondence with the Board of Revenue; in addition to the letters on the ordinary business of the Department, I addressed the Board on the following subjects:—

Trichy-poor: As a food for farm stock in times of scarcity. Observations on. Board's Proceedings, No. 1289, dated 14th May 1875.

Madras

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Madras Agricultural Exhibition: Revised Prize List and Regulations for, submitted. Board's Proceedings, No. 1344, dated 18th May 1875.

A Stock-breeding Farm: Land for. Report regarding efforts made to secure, and proposals regarding utilization of model farm as. Board's Proceedings, No. 1524, dated 5th June 1875, and 2919, dated 21st October 1875.

Jute Cultivation on the Sydapet Experimental Farm: Report on. Board's Proceedings, No. 1714, dated 21st June 1875.

Carolina Paddy: Supposed deterioration of, in India. Observations on. Board's Proceedings, No. 1895, dated 9th July 1875.

Hurriali Grass: Culture of. Memorandum on. Board's Proceedings, No. 1902, dated 9th July 1875.

Salt-soil: Analysis of. Report on. Board's Proceedings, No. 3016, dated 1st November 1875.

Maize and other Seeds: Distribution of. Proposals submitted. Board's Proceedings, No. 189, dated 22nd January 1876.

Agricultural College: Revised Prospectus for, submitted. Board's Proceedings, No. 942, dated 6th April 1876.

THE USE OF SALT IN AGRICULTURE.

198. The high price of salt in India is a serious drawback to agriculture. In England good agricultural salt for the use of stock, or for use as manure, can generally be purchased at about 30 s. per ton; similar salt costs, in this Presidency, about 50 rupees per ton. Live stock cannot be maintained in good health unless they have frequent and regular access to salt; but it is rather as a condiment than as a food that salt is so valuable. It renders food more palatable, improves the appetite, increases the flow of saliva, and assists the digestive processes. Salt is peculiarly obnoxious to intestinal worms, and the prevalence of these and other internal parasites, in such numbers in the farm stock of this country, is to be accounted for by the almost entire absence of salt in their diet.

199. Salt has long been used for promoting vegetation. It is of the greatest value as a manure in inland countries. Land under the influences of sea-breezes generally gets, by means of these breezes, sufficient salt for the requirements of agricultural crops. It has been ascertained by direct experiment that the land near some coasts receives annually as much as 300 lbs. of salt per acre carried to it by the winds. Salt is generally used as an auxiliary manure with lime or other manures. In England as much as 600 lbs. of salt per acre is applied with other manure to land intended for mangold wurtzel; and for meadow land a usual top-dressing is 200 lbs. of salt, with about 100 lbs. of nitrate of soda. Heavy dressings of salt are sometimes applied to pasture land to improve the herbage and kill insects injurious to grass.

200. Salt is also used to prevent the too rapid decomposition of organic manure, a purpose for which in this country, where putrefaction is so rapid, it is much needed; fold-yard manure when stacked in the field decomposes so rapidly, that in a space of four or five months the whole becomes a fine mould which, though valuable, does not serve the same purpose on the land as fold-yard manure in its natural state.

MANURE, AND THE PRODUCTION OF GREEN FODDER CROPS.

201. We are frequently informed that one reason for the wretched condition of agriculture in this country is the difficulty of obtaining manure. That manure cannot be obtained without trouble, and that its use puts the ryot to some extra labour, I readily admit. Farming would of course be a very much easier employment than it is, if all we had to do was to plough and sow our land, and to harvest and sell our crops; but in all long-settled countries the agriculturist must do a good deal more than this. Unfortunately, in this country, the more rapid is the increase of population, the more rapid is the decrease in the food-producing powers of our soils. As a general rule the productiveness of Indian soils is yearly decreasing, while in Europe, under the influence of modern farming, the arable soils are yearly becoming more productive.

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202. It is as much the duty of the ryot to exert himself in procuring manure for his soil as it is his duty to plough and sow his land. A ryot has no more right to expect a fair crop when he applies no manure to his dry land, then he would expect a good crop from a sowing of seed scattered over unploughed land. The cost of the manure consists chiefly of expenditure on labour in collecting and bringing manure to the land, and this labour most cultivators can themselves perform.

203. I cannot understand why in this country, the farmer should be allowed to do exactly as he likes with the land he rents from the State. The rent he pays is supposed to bear a fixed relation to the crop he produces, which, of course, would be a very fair way of determining the rent, provided the land was fairly tilled. If the land is only half tilled and starved, as regards manure, the State's share of the produce will appear large, but let the land be properly tilled and that share at once will bear but a small proportion to the whole produce. Every renter of State land should be compelled to use manure; if he does not use it he is robbing the State, for he carries off far more than he is entitled to. What house-owner would be content with an ordinary rent from a tenant who, besides availing himself of the usual privileges of tenancy, used up in his fires, as fuel, the window frames, doors, rafters, beams, and other wood in his house, and yet most of the ryots are dealing quite as badly with portions of the house, and yet most of the ryots are dealing quite as badly with the land rented by them from the State: not only are they taking out of the soil what would be removed under a fair system of husbandry, but they are destroying the natural productiveness of the soil.

204. It is true that the permanent exhaustion of arable soil under the influences of cropping is, practically, an impossibility; but it certainly is the case that under injudicious cropping the productiveness of a soil can speedily be brought down so low as to render the soil not worth cultivation; a state to which a very large proportion of the arable soils of this Presidency have already sunk.

205. In most civilized countries tenants are generally bound to have a certain portion of their arable land annually under what are called restorative crops, such as turnips, green fodder, &c., which must be converted into manure on the farms where they are raised, by the agency of the live stock. If it is necessary in countries where agriculture has reached a high state of perfection, to prescribe and enforce regulations for maintaining the fertility of the soil; surely, in this country where agriculture is in the hands of poor, ignorant, superstitious people, it is the duty of the State, to which the land belongs, to prescribe and enforce regulations for the maintenance of its fertility.

206. We have in this country many fodder crops eminently suited for general cultivation; why not, then, insist upon the ryot devoting a certain portion of his land annually to their culture. The proportion to the whole area need be but small; a sufficient area only to raise fodder for the working and milch cattle kept on the holding. In this way a certain quantity of manure would be ensured, and the deteriorating influences to which the land is now subjected would in some measure be checked. We are told that the ryot cannot afford to grow fodder; my answer is that he cannot afford to lose his cattle by starvation or lose their full services from weakness, and that the country cannot afford the cost of periodical famines.

207. Of course the cropping of 10 or 15 per cent. of our arable land by fodder crops would not altogether render the country independent in an unusually bad season, but I am convinced that if a fair proportion of farmyard manure, made by properly fed cattle, was applied regularly to our arable soils, their powers of absorbing and retaining moisture would be greatly increased, and in this way vast stores of moisture would be available, where now moisture is almost entirely absent.

208. The question is not whether it will pay the ryot to grow fodder any more than it is whether it pays him to plough his land; the one duty is as necessary as the other. It is ridiculous to expect that the ryot will obtain a direct return for the fodder he may grow; the advantages derived from the consumption of a fodder crop on a farm are never secured in a direct way or at once, but they influence for good the whole working of a farm for years in many

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many indirect ways, which effects in their aggregate value exceed any ordinary grain crop produced under the conditions common. Under the village system there would be no difficulty whatever whether the prescribed area of land was annually cropped with

value of
country.
mining
crops.

TOWN REFUSE AND THE PRODUCTION OF FUEL.

209. Nearly all the municipalities in the plains of Southern India experience great difficulty in disposing of the refuse of their towns. Nowhere in the plains, except to a very limited extent, has the ryot been induced to cart away town refuse for use as manure. One reason for this is that in none of these towns have any attempts been made to separate the valuable portions of the refuse, which alone would bear the cost of cartage. Pieces of bricks, of pantiles, bottles, chatties, &c., and similar rubbish mixed with town refuse greatly reduce its value for agricultural use.

210. I intend in the remarks that follow, only to refer to the heaps of rubbish which now so frequently disfigure the outskirts of towns. These heaps having in most instances existed for years, any noxious matter which they may originally have contained will have become thoroughly decomposed and innocuous.

211. We cannot expect municipal corporations to engage directly in agriculture, they have so much to do in attending to the sanitary requirements of their towns; but I can see no reason why municipal bodies should not be extensive holders of fuel plantations, in the working of which they could use up a great deal of the refuse of the town, especially that which has been stored in heaps for a long time.

212. Cheap fuel is the one great want of our towns. At present, fuel is so costly it is utterly impossible to make use of steam machinery which otherwise might be so usefully employed in raising water for household use, for washing drains, &c., &c. At the present price of firewood in the city of Madras it would require 20 rupees worth of firewood to do the work in raising the water in England is done by 20 shillings worth of coal. Getting aside the benefit that would be experienced by the towns from a reduction in the cost of fuel, the municipal corporations themselves derive much benefit in the reduced prices they would have to pay for bricks, tiles, and lime, for, at present, the expense on account of fuel constitutes from 40 to 50 per cent. of the cost of these materials. There are many other ways in which municipalities would directly and indirectly derive benefit from an abundant and cheap supply of fuel being made available.

213. A great deal might be done by raising fuel trees along the sides of our roads: under proper arrangements, with the aid of manure, a very large quantity of fuel might be produced in this way. If the roadside fuel trees were planted, sufficiently close, felling might be begun when they were about one-half grown, every alternate tree being then cut down, and the spaces filled with young trees; in this way uniformity would be preserved, and the roads would not be disfigured in appearance. The remainder of the first planted trees might be cut down when matured, and the spaces they occupied might be replanted. If the fuel trees were casuarinas, a crop would in this way be obtained every four or five years, which, by the liberal aid of manure and water, there would be no difficulty whatever in securing.

214. Though a very large quantity of town manure might thus be usefully employed in raising roadside trees for use as fuel, there would still, in most towns, be a considerable quantity of manure for disposal.

215. Near many towns there is plenty of exhausted arable land available, or more blocks of which, conveniently situated as regards roads, might be purchased or hired by the municipal authorities. This land, after being heavily manured and deeply ploughed, might be planted with fuel trees. If properly fenced, the expense of maintaining these plantations would not be great after the first two or three years. A dressing of manure might annually be spread over the ground, which would promote the growth of the trees, and, with the leaves

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leaves that fall, the indigenous vegetation that will spring up and die on the ground, the soil, after the removal of the trees, would be rendered more valuable for agricultural purposes, or for replanting with trees. Of course these annual dressings of manure should be from a compost heap, and not the fresh night-soil of a town.

216. A number of fuel plantations, thus established, in connection with each municipality, would tend to improve the climate of the neighbourhood and, when properly situated and managed, there should be nothing in these plantations to prove injurious to health.

FISH CULTURE.

217. No attention has been given in Southern India to the artificial propagation of edible fish, and yet there are few countries in which there are such facilities and inducements. We possess vast areas of water in the shape of rivers, tanks, and channels over which Government already has direct control. It is estimated in America that one acre of water will produce in fish as much human food as two acres of land. From my experience in the preservation of the portion of the River Adyar, which belongs to the Sydapet Farm Estate, I believe that, under proper arrangements, there would be no difficulty in producing, on the average, from 100 to 150 lbs. of fish annually per acre of water, assuming, of course, that there are proper facilities for rearing and breeding the fish, that means are taken to prevent the destruction of spawn and the young fish, and that there is sufficient food available for the fish either naturally or supplied artificially. It is true that during the hot season the majority of our rivers, tanks, &c., become dry, but there would be no great difficulty in providing means for sustaining a large proportion of the fish during the dry season in all rivers and tanks of any extent, as in nearly all such there are holes or hollows in which there is water throughout the year, which, when necessary, might be deepened and extended, and their margins planted around with shrubs and other vegetation likely to grow in such situations, in view to protecting the fish and giving them shelter, and supplying them with food.

218. The same line of argument might be made in regard to the rivers in the Madras Presidency, under proper management, be made to add very materially to the food resources of the country. It would be some time before it was possible to stock with new breeds of edible fish any of these large rivers, but much benefit would eventually result if but the most suitable portions only were stocked.

219. In England, France, America, and Australia pisciculture is now attracting much attention. In these countries some most important results have been achieved in re-stocking rivers which, by the neglect of ordinary precautions, had become almost destitute of edible fish.

