

1882.
Board of Revenue,
MADRAS.

Proceedings, 8th August 1882, No. 1962.

Submitting to Government the Board's
*General Report on the Saidāpet Experimental
Farm* for the year 1881-82.

PROCEEDINGS OF THE BOARD OF REVENUE.

READ—the following letter from W. R. ROBERTSON, Esq., M.R.A.C., Superintendent, Government Farms, to the Secretary to the Board of Revenue, dated Saidápet, 9th September 1882, No. 1263 :—

I have the honor to submit my annual report for the year ending 31st of March last, on the agricultural operations conducted by me.

2. The report, necessarily, contains references to some subjects on which I have already submitted detailed reports; but these detailed reports are not available to the general public in a form convenient for record or reference, and it must be remembered that the main objects for which these reports are prepared are to get the experiments and trials repeated, and to encourage enquiry and enterprise amongst those engaged in husbandry.

3. I shall be glad if a larger number than usual of this, and the Farm Report, can be placed at my disposal for distribution. We have many applications for copies of the reports from educated Natives, and judging from my correspondence, the possession of a copy of one of these reports not unfrequently leads to enquiry, and in some instances to efforts at improvement.

4. Seeing that an Agricultural Exhibition is to be held on a large scale in Madras in February next, I venture to hope that this report, that of the Farm, and those of the preceding two years—not yet placed at public disposal—may be made available to the public in time to admit of some of the suggestions the report contains being utilized by intending exhibitors.

ENCLOSURE No. 1.

ANNUAL REPORT ON GOVERNMENT AGRICULTURAL OPERATIONS
IN THE MADRAS PRESIDENCY FOR THE YEAR ENDING 31ST
MARCH 1882.

SCHOOL OF AGRICULTURE.

A separate detailed report for this institution being under preparation, it is necessary only to refer to a few points of interest, or importance, connected with the work of the year.

2. At the beginning of the year, there were 39 students in the institution; 23 of these students left on the 30th of June, having then completed their period of training. At the beginning of the Winter Session, a new class was formed; it consisted of 26 members. At the close of the year there were 41 students on the roll; of these, 12 were supported as shown below :—

Mysore State	...	...	...	...	...	...	...	4
Patiala do.	...	...	...	...	...	...	...	1
Gondal do.	...	...	...	...	...	...	...	1
Dewas do.	...	...	...	...	...	...	...	1
Kattywar do.	...	...	...	...	...	...	...	1
Kárvetnagar Zemindari	...	...	...	...	...	...	...	1
Kálahasti do.	...	...	...	...	...	...	...	1
Yelandur Jaghiredar	...	...	...	...	...	...	...	2
Total	...	...	...	...	...	...	...	12

Thirteen were supported by their friends, and the remainder held Government stipendiaryships.

3. The usual courses of lectures were delivered. The practice of remunerating the lecturers by paying lecture fees, still continues in force; and this, is to be regretted, for, the fees payable next Winter Session, when there will be three classes in the College, would be almost sufficient to remunerate a lecturer for his whole services, for each of the chief subjects of instruction and, it would be a great advantage to secure the whole services of the lecturers.

4. The College buildings were opened by His Excellency the Right Honorable the Governor, in December last; the lower story has only yet been completed, but plans and estimates have been prepared for finishing, at once, the whole structure. The rooms have been suitably fitted up; and, have been found well adapted to the requirements of the institution. The Laboratory has been equipped with suitable fittings and apparatus, and is now in full working order. The Veterinary Hospital buildings have been completed, and the institution is now ready for opening. Further improvements have been made in the Botanical and Experimental grounds; the usefulness of these grounds has been shown in many ways; chiefly, by the facilities they have afforded the students to become familiar with the cultivated plants of South India, and in the convenience afforded for conducting small experiments which could not, with any degree of accuracy, be conducted in the fields.

5. The Library has been maintained in good order, and a number of new books and periodicals have been added to it.

THE SAIDAPET EXPERIMENTAL FARM.

6. A full report showing the results of the year has already been submitted. The weather during the first few months was very unpropitious for farming. Crops that were standing on the land during this period—cotton, indigo, castor-oil, Guinea grass, &c.—suffered severely. No summer crops were sown. The rains, which fell in August, were utilized for getting forward tillage operations, especially deep ploughing and sub-soil ploughing; both operations were performed on a much larger scale than usual. The weather during this month and the next, was very seasonable, and considerable areas of maize, cotton, sorghum, &c., were sown. In October the weather was very dry, and therefore prejudicial to the young crops which had grown so luxuriantly during the preceding month. November was a very wet month, and on two or three days the rainfall was very heavy; it was especially heavy on the 13th, when it amounted to 6·80 inches. Unfortunately, the early-sown crops were then in flower, and the heavy rain interrupted the fertilization processes, and the result, of course, was a considerable decrease in the outturn of these crops. During the remainder of the year, ordinary weather was experienced, except that during January and February, unusually heavy fogs prevailed in the early mornings. The total rainfall of the year was only 44·28 inches, that is, about 8 inches, or nearly 800 tons of water, per acre, less than the average annual fall, in the ten previous years.

7. Crops suffered but little, from fungoid disease, or insects. A considerable area of fodder crop was, as usual, grown for the draught and dairy stock. This consisted chiefly of horse-gram, Guinea grass, and different varieties of Sorghum. The outturn on 34 acres amounted to 112,460 lb. or 3,308 lb. of fodder per acre, while some of the crops, in addition, afforded grazing for some time, for sheep and cattle.

8. Considering the unfavorable character of the season, the unirrigated crops yielded very satisfactorily. From 80 lb. of maize seed imported from Australia, the outturn obtained was 3,378 lb. of grain and 24,595 lb. of straw. About 2,500 lb. of the acclimatized maize seed has been placed at the disposal of Collectors for District Experiments. The crop is one that specially deserves attention in Southern India both as, a fodder-producer, and, a producer of human food. Some results made in extracting the juice of the fresh stems for making jaggery, were encouraging; the jaggery obtained amounted to 3 per cent. of the entire weight of the stems. A new variety of Sorghum was experimented with—the Broom Millet, of the United States; the outturn—960 lb. of grain and 4,256 lb. of straw, per acre—was very good; but the crop does not seem to possess any special excellencies, as far as the experience gained

shows. Further trials with the indigenous black cholum, show that it is not identical with the *Sorghum Saccharatum*, which also produces a black seed; the indigenous variety, contains little or no saccharine matter in its juice; while the juice of the former is rich in saccharine matters. A considerable area of land was cropped with Minnesota Early Amber Sugar-cane, the seed having been obtained from the United States. Several of the crops were good, and the jaggery-making experiments from the juice, were encouraging; the percentage of jaggery averaged about $4\frac{1}{2}$ per cent. the weight of the whole straw, and about 6 per cent. the weight of the topped stems. The jaggery showed a much greater tendency to crystallize than the jaggery of any other *Sorghum* yet experimented with, at the farm. A quantity of the seed of this valuable sugar *Sorghum*, will be distributed. *Sorghum Saccharatum* and *Sorghum Kaffrarium* were both grown; the results were very satisfactory. Some experiments were made with the juice of the latter, in making jaggery; the outturn was about 4 per cent. the weight of the straw.

9. Reana Luxurians was grown to some extent. Though a valuable crop for high cultivation, it cannot compete with Guinea grass, and similar crops, under ordinary culture; while the grain, is useless for feeding purpose; except when roasted.

10. The irrigated crops were produced under difficulties. There was no water in the irrigation tank until two months after the commencement of the usual sowing season, and the quantity that was afterwards collected was not sufficient to bring the crops to maturity. Only a "single" crop was, therefore, obtained, the outturn of which per acre was 978 lb. of grain and 4,107 lb. of straw over the whole area irrigated. Oil-cake and paddy husks were largely used as manures for this land. Madagascar paddy was not a success, but this was attributable to the unfavorable weather, while the crop was growing. Experiments made elsewhere, with farm-grown Madagascar seed, gave very fair results, even when grown almost as a dry crop. Samples of the grain and rice were sent to London for valuation, and the values put upon them were higher, in each case, than those of ordinary paddy and rice at the time. Experiments are about to be instituted to determine the least quantity of water, that will suffice to bring a crop of Madagascar paddy to maturity, in an ordinary season.

11. The plantations of *Casuarina* trees are being extended on the poorer portions of the estate. A number of *Casuarina* trees were sold for fair prices. It has been found that the *Casuarina* trees fix these blowing sands; while the leaves, they shed, add organic matter to the soils, points of considerable importance. It is intended, as the *Casuarina* trees are cut down, to plant fruit trees in their places. The season was, of course, a very bad one for indigo, cotton, and castor-oil crops. The cotton crop was almost entirely the New Orleans variety. Though the seed was imported about ten years ago, and the crop has grown, since then, entirely on the poor sandy soils of the farm, neither the plant nor lint, appear to have, in any way, deteriorated. Dr. Forbes Watson, F.R.S., who visited the farm, in February, was much struck with the high quality of the lint. The percentage of lint, from the cotton-in-seed, was in some cases as high as 33. The indigenous cotton, it must be remembered, seldom gives an outturn of lint, of more than 22 to 24 per cent. A number of new grasses were introduced from the United States, some of which are of great promise. And, from North Queensland, the seed of several varieties of *Eucalypti* was obtained; from this seed, there are now some thriving trees at the farm; these results, afford grounds for hope that, at least one variety of the *Eucalyptus*, may be introduced on the plains of South India.

12. Experiments were instituted to determine the comparative fertilizing effects of sheep manure and indigo vat-refuse. Lime was used as a manure for indigo; and Gypsum, as a manure for the sugar *Sorghums*. The two series of experiments—one with manures ordinarily procurable, and the other with cattle dung and cattle dung ashes—were continued. It was found that indigo vat-refuse produced very good effects; and, that lime, considerably increased the outturn of the indigo crop. Farm-yard manure, produced a better result, than slaughter-house refuse, on the cotton crop. In one experiment, gypsum produced but little effect on the crop as regards the yield of sugar; while, in another experiment, the total yield of sugar was considerably

increased. The outturn of a crop of arrowroot, was considerably increased by an application of lime. In the series of experiments with ordinary manures, the best return was obtained by an application of farm manure at the rate of 10 tons per acre, the yield of grain being 990 lb. and of straw 8,960 lb.; while, the average of the unmanured plots, was only 626 lb. of grain and 7,243 lb. of straw per acre; an application of 625 lb. of oil-cake, costing about Rs. 6 per acre produced 124 lb. of grain and 1,167 lb. of straw, more than the unmanured plots; the cost was, therefore, amply repaid. The results of the cattle-dung and ash experiments, were greatly lessened in value, by the crop having been severely attacked by "rust" when in flower. The experiments are, however, being continued.

13. The practice of growing horse-grass, as a summer crop, for eating off by stock, or, for ploughing-in, was extensively carried out last year. It is believed that very good results have been secured therefrom, chiefly, in conserving the nitrogen which, under the processes of nitrification, accumulate during dry weather, in the soil, and which, if not taken up by the plant and held in organic combinations, would be washed away, and lost, when heavy rain fell. When it is remembered that nitrogen cannot be purchased at a less cost than Rs. 300 per ton, and that, as much as 30 lb. per acre, may accumulate in a good soil in the dry season, the value of the foregoing practice will be recognized. Some experiments were made in view to hasten the germination of cocoanuts by steeping them in acid solutions of different strength; but, it was found that better results were obtained by steeping them in water.

14. The Aden cattle continue to merit the high opinions expressed regarding them in previous reports. In October last 2 bulls, 3 cows, and 4 bull-calves were imported from Aden. The herd now consists of 13 bulls, 6 cows, and 1 heifer. It is intended shortly to station some of the bulls in localities, where they can be of use in improving native dairy stock. Besides the Aden breed, the Nellore and the Kerry breeds, were, also, experimented with. The results of the experiments were very encouraging, in showing that much can be done to improve South Indian dairy stock.

15. The sheep were free from disease. The Southdown-Mysore rams continued in good health and, the lambs got by them this season, are a fine lot. A number of rams were distributed for breeding purposes.

16. A larger number of ploughs were applied for and sold, than in any preceding year. The ploughs, in greatest request, in the early part of the year, were light wooden ploughs with a single stilt and two handles, but recently the demand has been more for single-stilted Swedish ploughs and American combined ploughs; though, these are more costly, they are very durable, and cheaper in the end. Arrangements have been made to obtain from Sweden 250 steel ploughs; it is expected that they will be delivered in Madras at a cost under Rs. 16 each; they are the best ploughs, for ordinary use, that have been introduced into this country.

AGRICULTURAL TOURS.

17. It was impossible that any agricultural tour could be undertaken by an European officer of the department, as two, were absent on sick leave for eight months, and seven months, respectively, and the other officer, had more work to do at his head-quarters, than he could perform satisfactorily. It is to be regretted, that no tour could be made.

AGRICULTURAL EXHIBITIONS.

18. No exhibitions were held; arrangements, however, have been made for holding a large Central Exhibition in Madras in the early part of next year, and a scheme has been submitted and approved, for holding a series of Agricultural Shows in various parts of the Presidency.

THE MADRAS ANNUAL PLOUGHING MATCHES.

19. The Annual Ploughing Matches were held on the Saidapet Experimental Farm on the morning of Saturday, the 28th January. The land on which the competi-

tions were held, was of two descriptions—"irrigated" and "unirrigated." The latter was a sandy loam, free and easy to work; the irrigated land contained more clay, and it was, therefore, stiffer and more difficult to work. The dry land, had been under ragi; and, all the land at the time was in stubble. The competitions were distributed so that the public might see the working of both improved, and country ploughs, in land differing in character and condition. There were fifty competitors; of these, eight were farm employes. The majority of the competitors used the common country plough; a few, worked improved ploughs which, they had purchased from the farm and elsewhere. The average depth at which the country ploughs worked was not more than $3\frac{1}{2}$ inches; while, as is usually the case when these ploughs are employed, more than half of the land was left unmoved, in ribs, and the grassy surface was unturned, being simply loosened after the manner of a cultivator. The improved ploughs worked the land, on the average, 6 inches deep, the whole soil was moved, and the grassy surface was well turned over. As regards speed, in performing the work, the improved ploughs were equally superior; on the average, they completed each plot in 45 minutes, which is equal to an acre ploughed in $7\frac{1}{2}$ hours. The unimproved ploughs averaged, 60 minutes for each plot, thus getting over an acre in 10 hours. The results of the matches, were conclusive, in showing the great superiority of the improved ploughs, over the ordinary country plough, as regards, efficiency of work, cost of performing the work, and speed in doing the work. The cattle that were employed to draw the improved ploughs were certainly superior to those used in drawing the country ploughs, but they were not superior to the cattle generally used in Cuddapah, Salem, Nellore, and in some other Districts. In several Districts the plough cattle are not fitted to draw the larger improved ploughs, but for these localities a smaller plough of the kind can be provided. A students' ploughing match was held, to determine the best ploughmen in the Senior class; it was an interesting match, from the fact that the selected competitors belonged to localities so widely apart—one, to Bengal; one, to Bombay; and two, to this Presidency. The Bengal student carried off the first prize. The work done was very good indeed.

SEED DISTRIBUTION, AND DISTRICT EXPERIMENTS.

20. The following statement shows the quantities of seeds distributed for experimental cultivation, during the year; they were, in most instances, supplied and delivered, free of charge:—

	Pounds.
Madagascar paddy	1,871
Planter's Friend (Sorghum Kaffrarium)	987
Cotton seed	546
Maize (Zea mays)	509
Chinese sugar-cane (S. Saccharatum)	208
Castor beans	215
Reana Luxurians	103
Amber Sugar-cane	35
Tobacco seed	1
Yellow cholum (S. Vulgare)	14
Indigo seed	9
Miscellaneous seeds	90

Several reports have been received, showing the results of experiments made with these seeds; from these, the following extracts are taken:—

Number.	General Nature of Soil.	Area of Land sown.	Kind and Quantity of Manure used.	Pounds of Seed sown.	Date of sowing.	Cultivation during growth of Crops.	Number of Times irrigated.	Number of Inches of Rainfall and Number of Wet Days recorded at nearest Station during growth of Crops.		Date when Crop harvested.	Duration of Growth.	Outturn per Acre.	
								Wet Days.	Inches.			Grain.	Dry Straw.
MADURA DISTRICT.													
1	Light-colored soil	16	No manure was used.	25	21st October 1881.	None	7 times	15	9.2	5th March 1882.	136	844	3,875
MALABAR DISTRICT.													
1	Raahi Pacima	09	Cow-dung and ashes.	9½	2nd September 1881.	None	Not irrigated.	..	..	14th January 1882.	135	333	266
GODAVARI DISTRICT.													
1	Regar clay	5	None	4	26th July 1881.	Weeding out	Not irrigated.	34	14.9	31st October 1881.	97	480	480
2	Do.	5	None	3	8th July 1881.	None	There was water always in the field.	42	18.4	29th November 1881.	145	340	600
3	Do.	5	None	3	10th July 1881.	None	Not irrigated.	42	18.4	12th December 1881.	155	160	320
4	Do.	5	Manured with cattle dung.	1½	14th July 1881.	None	10 times	16	5.0	1st December 1881.	139	120	..
TINNEVELLY DISTRICT.													
1	Red loam	3	3,600 lb. of cow-dung and 500 sheep picketted for one night.	38	18th November 1881.	Weeded	Not irrigated.	15	..	20th March 1882.	124	283	400
2	Do.	2	1,050 lb. cow-dung and a flock containing 1,000 sheep for one night.	20	4th October 1881.	None	Do.	..	..	3rd March 1882.	151	400	2,700
3	Middle sort of clay	4	¾ handy-load cow-dung.	10	28th September 1881.	Weeded	There was always two inches of water above the soil.	..	..	3rd March 1882.	157	2,750	3,200
The seedlings were transplanted forty-eight days after sowing.													

Seeds were sown broadcast.

Each ear of corn with straw weighed 11 oz. The seedlings were transplanted.

Each ear of corn with straw weighed 9 oz.; seeds were sown broadcast.

Consumed by trespassing cattle. Crop partly failed by blight. The seedlings were transplanted.

The seeds were eaten by weevils; only one half of what was sown sprang up.

This paddy requires smaller quantity of water, and if cultivated carefully, the yield will be more abundant and be very profitable to ryots. The seedlings were transplanted forty-eight days after sowing.

Number.	General Nature of Soil.	Area of Land sown.	Kind and Quantity of Manure used.	Pounds of Seed sown.	Date of sowing.	Cultivation during growth of Crops.	Number of Times irrigated.	Number of Inches of Rainfall and Number of Wet Days recorded at nearest Station during growth of Crops.		Date when Crop harvested.	Duration of Growth.	Outturn per Acre.		
								Wet Days.	Inches.			Grain.	Dry Straw.	
1	TANJORE DISTRICT. Alluvial deposit with sub- strata of sand. NORTH ARCOT.	1-13	20 cart-loads of cow-dung.	234	22nd July 1881.	4 times weeded..	30 times ..	3	..	18th Decem- ber 1881.	150	1,911	1,274	Raised in nursery bed and trans- planted.
1	Black soil	2-04	30 bandy-loads town sweepings.	32½	4th October 1881.	Twice weeded..	5 times a week.	22	..	19th March 1882.	167	242	530	Sown broadcast. The crop grew very well throughout, though the yield was poor; this is due to the excess of rainfall during the time of growth. It would thrive better on lighter and more sandy soil. The grain is hard and the rice is pronounced to be of very good quality.
1	COIMBATORE DISTRICT. Sandy	5	40 lb. rubbish ..	24	16th August 1881.	4 times weeded.	30 times ..	60	10-42	11th Jan- uary 1882.	149	166	..	
1	NORTH ARCOT DISTRICT. Wet land, clay mixed with sand.	4	One bandy-load of cow-dung.	3½	20th Septem- ber 1881.	Weeded out after one month. The crop was trans- planted.	Irrigated once in 2 days.	26	15	15th Jan- uary 1882.	117	450	1,575	
2	Good soil mixed with clay and sand.	3	Four Maunds of jungle leaves.	2½	26th August 1881.	Do.	None..	..	..	26th Jan- uary 1882.	153	927	911	
	Fertile land.. .. .	4	Requires no manure as it is a first rate soil.	MRS. 1½	21st August 1881.	Weeded after 25 days. The crops were trans- planted.	Irrigated daily.	..	21	17th Jan- uary 1882.	150	1,950	..	
	MALABAR DISTRICT. Gravelly and calcareous ..	1-00	..	10	29th August 1881.	PLANTER'S FRIEND. Weeded ..	..	36	20-0	..	..	120	..	Merely turned up with common country plough; and the seed was sown broadcast. The land was previously fallow for some years.

21. The following extracts are of interest :—

MADAGASCAR PADDY.

Extract from a Memorandum by Mr. Jacob Savariroya Pillai, of Palamcottah.

1. "I got 40 lb. of Madagascar paddy on 30th August 1881 from the Government Farm Office at Madras and sowed it in my field watered by the Erandai tank lake at Vijeianarayanam in Nanguneri Taluk, Tinnevely, with the object of trying if it could be cultivated with advantage in these parts.

2. "As I was ignorant of the mode of cultivating it, I followed the system pursued in Tinnevely.

3. "The field was properly prepared and manured with cow-dung and sheep-dung before the rain set in. There were only 38 lb. after winnowing. It was sowed on a piece of land measuring 30 cents. on 18th November 1881. As the seeds were worm-eaten only one half of what was sown sprang up. The land was neither very humid nor did the moisture thereof easily pass off.

4. "There were occasional heavy showers extending over fifteen days after the sowing. The days on which there were drizzling rains were not reckoned. I had no rain gauge with me. The crop was not watered at all.

5. "At the commencement, the crop did not look healthy and thriving, partly perhaps by excessive rain and partly by disease. But by degrees it throve well. Its stalk was large, stem very thick, and blades very broad. Its height was nearly 70 inches and the length of the ears of corn nearly 18 inches. (I think some injury will be done to the plant if standing during the windy season). The yield of the original seed is plump. At the time of sowing the husk of the seed was thick and the grain of rice long and slender. The rice of the yield is full and fat and the husk delicate.

6. "It seems to me that this paddy can be cultivated in moist punjah lands and in nunjah lands which depend upon a small supply of water. If cultivated with care this will, I have no doubt, yield an abundant crop and be very profitable to ryots."

7. "I have got 85 lb. of seed. I intend sowing it again during the next monsoon, and I shall, if desired, submit a report thereon."

REANA LUXURIANS.

22. Extract from a Report from the Tahsildar of Kulitalai Taluk, Trichinopoly District.

"The land was at first well ploughed, manured, and divided into plots in the same manner as required for growing ragi seedlings, and the $\frac{1}{2}$ lb. of Reana Luxurians seeds received from the Huzur were sown therein on the 15th of September. Sprouts came up four or five days after the sowing. Till the young plants arrived to a height of eight or nine inches they looked like cumbao plants. They were watered once in three days as in the case of ragi seedlings. After attaining a height of six inches they were on the 14th October transplanted into land prepared as if for ragi transplantation and well turned up and divested of hard substances, &c. A few days after the plants were looked after in the same way as ragi, that is to say, twenty days after the transplantation the land was turned up with a hoe and the plants were watered by baling once in four days. Within two months after the transplantation the plants like cholum attained a height of eight or nine feet. Each plant had about four or five ears of the length of a finger, which looked like those of cholum. The ears came to perfection in a month and were fit to be harvested. On 20th January the harvest was made, and the yield was ascertained to be twenty-four Madras measures about 75 lb. of grain, and four bundles of stalks, each bundle as large as to require a rope of five cubits to tie. The grain is more solid than the ordinary cholum. The cultivation occupied four months and odd days from the date of sowing to that of harvest. The four bundles of stalks will probably weigh some 800 lb.

SORGHUM SACCHARATUM AND KAFFRARIUM.

23. Extract from a letter from Messrs. Minchin Brothers and Co., Aska.

"We have the honor to give below the results of our experimental cultivation of Sorghum and Planter's Friend, the seeds of which you very kindly procured for us. We did not at time of sowing weigh the quantity of seed used per acre, nor did we take the weight of the canes produced per acre, as the seed was much of it a failure, but we weighed a number of canes and got the following average results :—

"*Sorghum*."—7,270 canes weighed when topped and stripped 3,780 lb., which after milling produced 111½ gallons juice, average density 17° balling. On this juice being boiled, 247 lb. goor or jaggery were obtained.

Planter's Friend.—5,296 canes when topped and stripped weighed 7,560 lb., which after milling produced 275 gallons juice, average density 15° balling. On this juice being boiled, 546 lb. goor or jaggery were obtained.

"The following are the analyses of the jaggery made :—

	Sorghum.				Planter's Friend.			
Cane sugar	73.00	...	...	...	74.00	...	...	...
Glucose	8.78	...	...	...	9.42	...	...	...
Moisture	4.84	...	...	...	4.52	...	...	...
Insoluble matter	3.16	...	...	...	2.26	...	...	...
Extra items	4.20	...	...	...	4.92	...	...	...
Ash	2.74	...	...	...	2.26	...	...	...
Salts	3.28	...	...	...	2.62	...	...	...
	100.00	...	...	...	100.00	...	...	...

"We might mention that we had not all our arrangements for cultivation complete, nor are we at all certain as to the time of sowing in this district, or the results might have been more satisfactory.

"The crops were seriously damaged by heavy rain and subsequently were completely destroyed by the floods we had in October, but previous to this date we took what appeared to be the finest cane of Sorghum both as regards size and healthiness and found it measured 14 feet long, 4½ inches circumference and weighed 4½ lb. This gave 2½ lb. juice 16° balling, and measure 2 lb.

"We send herewith samples of this jaggery, produced by the native method of concentration."

ARROW-ROOT.

24. Extract from a letter from the Collector of South Canara, dated 10th March 1882, No. 517.

"With reference to paragraph 48 of your report on the Saidápet Farm, recorded with the Board's Proceedings, dated 10th December 1881, No. 3182, I have the honor to forward specimens of arrow-root prepared from a plant common in the jungles of this district and should be obliged by your informing me how it compares in quality with that grown on the Farm which you estimate to be worth about four annas a pound. I should also be glad to learn whether it is likely, that cultivation would lead to an improvement in the quantity or quality, or both, and any information as to the method of preparing the soil, and the best manner of treating the plant in this district, with its annual rainfall of about 130 inches between June and November, would be thankfully received.

2. "The plant I believe to be the same as that experimented on by you, viz., *Curcuma-angustifolia*, but I send a few of the tubers for identification."

The samples were sent to Mr. Hamilton, F.C.S., for examination and analyses. The following extracts, are from his report thereon :—

"The samples of arrow-root sent are from the *Curcuma*: they exhibit under the microscope the characters of the granules peculiar to this variety of starch. This starch cannot be compared with that of the *Maranta*, which is the richest of all the feculas. The mucilage, however, yielded by sample, marked "1st sort" is of a superior description and nearly as good as that of the *Maranta*. This sample is susceptible of further improvement; it contained a number of extraneous matters, black particles, straw, &c., all of which must have been introduced during the process of drying. The other two samples were decidedly inferior. The three samples when soaked in cold water gave indications of the presence of slight acidity; they also exhibit to a slight extent transformation of the starch from the insoluble to the soluble form. I may add that the Farm sample also gave the same reaction, but to a less extent. Any unnecessary exposure to the solar heat should be avoided. If the samples could be ground to a fine powder it would add to their appearance and would fit them for immediate conversion into mucilage. I would suggest the use of a solution of caustic soda about 200 grains (half an ounce nearly) to a gallon of water for steeping the pulped roots, in lieu of plain water; this has been found useful in disintegrating and dissolving the nitrogenous matter. Thorough washing in pure spring water, will remove all traces of the soda."

PLOUGHING EXHIBITIONS.

25. Arrangements were made, at the request of the Collectors, for ploughing demonstrations with improved ploughs in the Cuddapah, and Kurnool Districts, but owing to the prevalence of cholera, it was decided that they should not be held in the year.

EXPERIMENTS IN THE BELLARY DISTRICT WITH BEHEEA, AND THE NATIVE, SUGAR-CANE MILLS.

26. One of the small sugar-cane mills made by Messrs. Thomson and Mylne, of Beheea, Bengal, was obtained, and sent to the Bellary District, for experimental trial. The cost of the mill, at Beheea, was Rs. 85, and the expenses incurred for bringing it to Madras and conveying it to the Bellary District amounted to Rs. 20-3-3. The Overseer of the Saidápet Farm, a trained mechanic, was sent to Bellary, to start the mill, and to work it, during its experimental trial. The experiments were conducted under the general direction of S. Russell, Esq., the Acting Head Assistant Collector of the Bellary District. They were conducted in the Hospet Taluk. The following extracts, are from Mr. Russell's report:—

“The price of the rollers of the Native Mill has been put down as Rs. 72. This, I believe is about the price of a pair of ordinary rollers. Some rollers, however, were shown to me during the course of the experiments valued at Rs. 100, although they were two years old. I understand a pair of rollers lasts about five or six years. The number of coolies required to attend the two mills is the same, three—one to drive the bullocks, and two to attend on the mill. The fourth experiment was, as far as I could judge, the most satisfactory experiment performed. There was no stop during the experiment, except those delays which would ordinarily occur when the mill would be in proper working order. This experiment might, I think, be considered as fairly showing the working power of the improved mill we experimented with, as compared with the ordinary mill. The result is, in my opinion, in favor of the improved mill. The ordinary mill is quicker than the mill used in our experiments, but the improved mill takes the juice out very much better than the ordinary mill. I should notice here that it was found absolutely necessary during the course of our experiments to put some canes through the improved mill twice. I note this, as I believe it is supposed the improved mill takes all the juice out by the canes passing through it once only. The Overseer who came from the Saidápet Farm has noticed in his remarks that the rollers of the mill with which we experimented were slightly defective. On being turned round with the press empty, they came in contact at certain points only, at other points there was a clear space between the rollers. The point is an important one, since, in all probability, owing to this cause, it was found necessary to put many of the canes twice through the mill. The improved mill thus in every experiment took a longer time to do its work than the ordinary mill. On this point, the second experiment is an important one. In that experiment, seven quarts of juice were obtained by putting a portion only of the canes through the mill twice, and notwithstanding this the improved mill produced less juice than the ordinary mill. It is therefore certain that a considerable amount of juice passed through without being squeezed out by the improved mill, due to the fact that *all* the canes were not put through the mill twice. During the course of our experiments, we took up some stalks of sugar-cane that had been three times through the ordinary mill and were thrown away as useless; out of three handfuls the improved mill squeezed about $\frac{1}{2}$ a quart of juice. All the ryots on seeing this were very greatly astonished, and unanimously declared that the improved mill was better than their ordinary mill.

“Many objections were made, and suggestions offered, by the ryots during the course of experiments. In the first place it was objected that the 6-inch roller is too small. This, I think, is so. An 8-inch roller is required, so as to allow three canes to pass through at the same time. Some of the canes are very large. With the present 6-inch roller the only way of squeezing the large canes was by taking the feeding board off in the first instance. I might notice here that at the very commencement, the holes in the feeding board had to be enlarged to make them useful. An 8-inch roller might therefore be considered as absolutely necessary for the canes that grow here. Questions were asked by the ryots as to whether the rollers could not be made, say one foot, two feet or even three feet long, if necessary, so as to enable five or six canes to pass through at one time. It was explained to the ryots that, so far as was known, only 6-inch and 8-inch rollers were made as yet. The Overseer was not able to give any further information on the question. For my own part, I do not see that there could be any objection in having the rollers, say 2 feet long. It would perhaps then require two bullocks to turn it round. But more work would be done. The question as to which would be the more economical would, assuming,

of course, that the matter is at all feasible, be a question of calculation. The ryots here seemed to be rather anxious about that one point, viz., whether the rollers could not be made large enough to give work sufficient for two bullocks. The point seems to me to be an important one, for one cooly can drive two bullocks as easily as one; and two coolies could look after the large mill just as well as the smaller one now in use. There would then be a great saving of labor in using the larger roller as compared with the smaller.

"No other objections of any worth were raised. I believe all the ryots who saw the mill were very favorably impressed with it, and I expect that before next season ryots requiring new mills, and probably others also, will indent upon us for mills of this improved pattern. For the information of the ryots, I should like to have the point settled as to what are the conditions upon which the size of the roller might be made larger."

27. The records of the experiments follow:—

	No. 1—MARCH 10TH.		No. 2—MARCH 11TH.		No. 3—MARCH 12TH.		No. 4—MARCH 13TH.		No. 5—MARCH 14TH.	
	Improved Mill.	Ordinary Mill.	Improved Mill.	Ordinary Mill.	Improved Mill.	Ordinary Mill.	Improved Mill.	Ordinary Mill.	Improved Mill.	Ordinary Mill.
Cost of the mill on the spot ..	Rs. 105-3-3, including freight and charges from Benice.	Rs. 100 ..	..	..	..	..	..	..	..	..
Weight of the mill ..	Lb. 304 ..	Lb. 3,000 ..	..	..	..	..	..	..	..	..
Time occupied in placing the mill ready for work.	Minutes 45 ..	Hours 12 ..	..	..	..	..	..	..	..	..
Men employed in placing the mill ready for work.	2 at As. 3 each	1 Carpenter at As. 10 per day.	..	..	..	..	..	..	..	..
Cost of moving the mill five miles, and setting it, ready for work.	11 As. ..	Rs. 2-1-0 ..	..	..	..	..	..	..	..	..
Time crushing occupied ..	128 minutes ..	109 minutes ..	105 minutes ..	92 minutes ..	91 minutes ..	64 minutes ..	177 minutes ..	119 minutes ..	286 minutes ..	246 minutes ..
Bullocks employed, and their hire per day.	One at As. 4 each	Four at As. 4 each.	One at As. 4 each.	Four at As. 4 each.	One at As. 4 each.	Four at As. 4 each.	One at As. 4 each.	Four at As. 4 each.	One at As. 4 each.	Four at As. 4 each.
Laborers employed and their wages per day.	3 at As. 3 each..	3 at As. 3 each.	3 at As. 3 each.	3 at As. 3 each.	3 at As. 3 each.	3 at As. 3 each.	3 at As. 3 each.	3 at As. 3 each.	3 at As. 3 each.	3 at As. 3 each.
Cost per day, for manual and bullock labor.	As. 13 ..	Rs. 1-9-0 ..	As. 13 ..	Rs. 1-9-0 ..	As. 13 ..	Rs. 1-9-0 ..	As. 13 ..	Rs. 1-9-0 ..	As. 13 ..	Rs. 1-9-0 ..
Weight of the canes when stripped and topped.	Lb. 500 ..	Lb. 500 ..	Lb. 600 ..	Lb. 600 ..	Lb. 600 ..	Lb. 600 ..	Lb. 1,000 ..	Lb. 1,000 ..	Lb. 1,500 ..	Lb. 1,500 ..
Weight of canes crushed in a day of eight hours.	Lb. 1,875 ..	Lb. 2,202 ..	Lb. 2,743 ..	Lb. 3,130 ..	Lb. 3,165 ..	Lb. 4,500 ..	Lb. 2,712 ..	Lb. 4,034 ..	Lb. 2,518 ..	Lb. 2,927 ..
Cost of crushing 1 ton of cane	Rs. 1 ..	Rs. 1-9-0 ..	As. 11 ..	Rs. 1-2-0 ..	As. 9-1 ..	As. 12 ..	As. 11 ..	As. 14 ..	As. 12 ..	As. 1-3-0 ..
Average length, and diameter, of the topped canes.	Length 30 inches and diameter 1 1/4 inch.	Length 30 inches and diameter 1 1/4 inch.	Length 31 inches and diameter 1 1/4 inch.	Length 31 inches and diameter 1 1/4 inch.	Length 30 inches and diameter 1 1/4 inch.	Length 30 inches and diameter 1 1/4 inch.	Length 30 inches and diameter 1 1/4 inch.	Length 30 inches and diameter 1 1/4 inch.	Length 30 inches and diameter 1 1/4 inch.	Length 30 inches and diameter 1 1/4 inch.
Weight of juice ..	Lb. 335 ..	Lb. 341 1/2 ..	Lb. 404 ..	Lb. 418 ..	Lb. 395 ..	Lb. 380 ..	Lb. 556 ..	Lb. 683 ..	Lb. 1,020 ..	Lb. 995 ..
Volume of juice ..	Quarts 134 ..	Quarts 136 1/2 ..	Quarts 160 ..	Quarts 163 ..	Quarts 166 ..	Quarts 160 ..	Quarts 275 ..	Quarts 266 ..	Quarts 416 1/2 ..	Quarts 408 ..
Weight of jaggy ..	Lb. 53 ..	Lb. 62 ..	Lb. 70 ..	Lb. 73 ..	Lb. 74 ..	Lb. 74 ..	Lb. 121 ..	Lb. 117 ..	Lb. 176 ..	Lb. 173 ..
Jaggery, formed percentage of cane.	10-6 ..	12-4 ..	11-7 ..	12-2 ..	12-3 ..	12-3 ..	12-1 ..	11-7 ..	11-7 ..	11-5 ..

These records are interesting and valuable, the experiments having, apparently, been conducted with great care. The results are generally in favor of the Beheea mill. In experimental work of the kind, difficulties are always experienced, such as those noticed but in actual practice, such difficulties speedily disappear. There is not a great difference in the cost of the mills. The conveyance charges, on the improved mill, amounted to Rs. 20-3-3, but they might be considerably reduced were a number of the mills obtained together. There can be no doubt but that the Beheea mill, under good management, will continue fit for work, a much longer time than the 5 or 6 years, the ordinary mill is said to last. The Beheea mill, has a considerable advantage over the other, as regards portability, and the readiness with which it can be got ready for work. The unimproved mill weighs 3,000 lb., the other weighs only 364 lb., and the latter can be set up ready for work in 45 minutes at a cost of less than one anna; while the former cannot be set up in less than 12 hours and, at a less cost than, 12 annas. Another advantage, the Beheea mill possesses, which has not been noticed in these extracts is, that it will crush the whole cane if not crooked; whereas, the unimproved mill can crush only short lengths of cane, thus necessitating the cutting up of the canes into short pieces, with the attendant disadvantage of the fermentation of the juice. During the experiments, only cut-up canes were used for both mills. The ordinary mill invariably finished its allotted quantity of cane, before the Beheea mill, when the cane was passed twice through the latter, but then the refuse cane of the latter contained no juice, whereas that of the unimproved mill contained an appreciable quantity, even when the canes had been three times crushed. It was necessary to pass twice through the Beheea mill only a portion of the canes, the remainder having parted with all their juice in the first operation. This difference in the work of the mill may, to a certain extent, be attributed to the varying thickness of the canes crushed. It is better, as a rule, to sort roughly the canes into two classes—"small," and "full-sized"—and to set the rollers and crush each class of cane separately. However, one of the rollers of the mill experimented with, is defective, being rather concave on one side; it was thus impossible to secure uniform working, as the surfaces of the rollers could not be maintained at a uniform distance apart. It will be noticed that the improved mill crushed the canes, at a much less cost per ton than the other. Mr. Russell's suggestion, that the rollers of the Beheea mill might be made both thicker and longer, is a good one. Of course, such improvements would increase the cost of the mill, as well as, its draught but, as Mr. Russell points out, the hire of cattle is very moderate in Bellary, and a cooly can, as readily drive a pair of bullocks, as a single one; while, with longer and thicker rollers more canes could be crushed in a day; and, from the longer exposure of the canes to the action of the rollers, crushing would be more efficiently done. Were it possible to remove all the juice in passing the canes once through the Beheea mill, it would possess a great advantage over the other mill. Arrangements have been made to obtain from Messrs. Thomson and Mylne one of their large sugar-cane mills for a further experiment in the Bellary District.

28. The outturn of juice from a given quantity of cane crushed by the new mill, improved with each trial. When the experiments began, the outturn was in favor of the native mill, but, during the last three days of the experiments the case was reversed; the outturn both in juice and jaggery being in favor of the Beheea mill, though, at the expense of more time, in the crushing operation. As regards the quality of the jaggery, it would appear, that the produce of the juice of canes crushed by the ordinary mill, was the best. The following, are the analyses made by Mr. Hamilton,

F.C.S. :—

	Jaggery prepared from Juice ex- pressed by improved Mill.	Jaggery prepared from Juice ex- pressed by ordi- nary Mill.
Sugar crystallizable	51-34	53-69
Do. non-crystallizable	16-05	13-88
Water and extractives with a little sand.	32-61	32-43
	<hr/> 100-00	<hr/> 100-00

29. Regarding these results, Mr. Hamilton wrote as follows :—

"The jaggery prepared from juice expressed by the improved mill, gave a lower percentage of sugar; the sample had become soft, and a molasses-like liquid was trickling away from its surface as is ordinarily seen with common jaggery. The other sample has remained firm and has not liquified on its surface. It is dark and apparently slightly burnt, and has not the clean appearance of the first sample. The glucose seems high in both; there may possibly be present some unknown organic matter reducing the test, but even if this did occur, it cannot affect the results materially. What it clearly shows is, that the system of boiling in open pans in the presence of a high temperature, is conducive to the production of glucose."

30. It is quite possible that the larger proportion of glucose, or non-crystallizable sugar, in the jaggery from the juice expressed by the Beheea mill, may be due to carelessness in boiling the special pan of juice, which afforded the sample. As noticed by Mr. Hamilton, the boiling process is a very rude one, and it is possible that the jaggery from each pan of juice, may differ in the percentage of crystallizable and non-crystallizable sugar; it will be noted that the total yield of sugar differed but slightly, being in the one case 67·39, and in the other 67·57 per cent.; while, the percentage of water in each, differed almost as little. If these analyses are compared with those at paragraph 23 made by Messrs. Minchin Brothers, it will be seen how greatly jaggery may vary in composition.

POUDRETTE.

31. Extract from a demi-official letter from the Collector of Tinnevely, dated 3rd February 1882.

"I wish you could advise me about the manufacture of poudrette. The night-soil is stored in large pits and on it are thrown the ashes obtained by burning all combustible rubbish. It is not scientifically made and does not get deodorised (as you will observe from a sample I am sending you for analysis), but I can generally sell it. The worst of it is that (notwithstanding the scarcity of manure) the best cow dung (almost pure) can be got generally for about a rupee a cubic yard, so that a remunerative price for night-soil is not to be expected. What I should like to see, would be the ryots collecting it for themselves, like the Japanese, and as they collect cattle dung. It would not pay to spend money in improving the quality of the stuff. Every one knows how it is made, and its quality will not bring much; but they do not know how to use it, and one man who bought a pit (70 cubic yards) one year, declined to do so, the next year, because it burnt up all his crops."

The sample was forwarded to Mr. Hamilton, F.C.S., for analysis; the following, are the results :—

	Per Cent.
Moisture	10·20
Combustible matter *	8·03
Silica, Ferric oxide, sand, and clay	76·87
Phosphoric acid	Traces.
Lime carbonate	2·15
Alkaline salts as chlorides	2·75
Total	100·00

* Containing ammonia 1·4

The analysis shows that, the manure is a very poor one.

DISTRIBUTION OF BREEDING RAMS.

32. Extract from a letter from the Collector of Tinnevely, dated 9th May 1882.

"I have the honor to state that from the reports received from the Divisional Officers some time ago it appears that two of the seven rams sent to me during the official year 1880-81 died of the disease called "வெப்பு நோய்" in tamil (a cattle disease caused by excessive heat). The remaining four rams as well as the lambs are reported to be doing well."

SWEDISH PLOUGHS IN THE BELLARY DISTRICT.

33. Extracts from letters received from Mr. J. G. Firth, of Bellary.

"The large Swedish plough you kindly lent me, about three months ago, arrived safely, and I immediately set about trying it in some regada land that had not been touched (so the ryots said) for thirty years. The share of the plough I found had a small piece rivetted to the point which, apparently, had been considerably worn. This was too weak to bear the strain of cutting

through dry regada, and consequently the share bent at the junction. I had therefore to get a new share made at the workshop of Mr. Sabapathy's Cotton Press. As soon as it was ready I recommenced the trial and the work was excellent, surpassing far the work turned out by the pedda madaka (big plough) drawn by twelve bullocks. This experiment was carried out when there had not been any rain for several months, and the ground was so dry and hard that large clods, some 15 inches in diameter, were broken with difficulty when dashed on the ground from a height of six feet. Mr. Sabapathy proceeded to Verapuram Station (eighteen miles from Bellary) and found twelve bullocks wearily tugging at a pedda madaka in a regade field about a mile from the station. The twelve bullocks were put to the Swedish plough and drew it through the soil to a depth of ten inches with so much ease that three pairs of bullocks were taken off, and the remaining three pairs drew the plough with less effort than the twelve bullocks had to be put forth when drawing the pedda madaka. I overheard one ryot observing to his companions: "The twelve bullocks could not raise so much soil as the six bullocks are now doing." The soil was first sort regada with a very slight degree of moisture, as there has been scarcely any rain as yet and not all for about twenty days. These experiments, with some others that I have tried, have satisfied me that it will be highly profitable to use the English plough of strong make instead of the twelve-bullock plough (pedda madaka) since it will plough an acre, in half the time, and with half the number of cattle used by the latter, thus reducing the expense to one-fourth."

From the same.

"With reference to your letter, dated 4th instant, I have the honor to state that the eight Swedish ploughs sold to P. S. Annamalai Moodeliar for Rs. 317 are for Mr. Sabapathy Moodeliar, the demand for them being the result of our exhibition of the iron Swedish plough at Verapuram as detailed in my letter of 25 ultimo, in which I stated that it was probable that a demand would spring up for large iron ploughs similar to the one lent to me. Two or three days after writing that letter, the ryot to whom we lent the plough and who owns 130 acres of regada land came to Bellary and stated that he found that four bullocks working with the iron plough did 50 per cent. more work and with more ease than twelve bullocks with the pedda madaka and asked for four ploughs of the same kind, two for himself and two to send to a relative in the Rayadrug Taluk. He also stated that another ryot wanted four ploughs, several others wanted one each, and he thought that in three months there would be a demand for 500 or 600 ploughs, as the ryots were coming from surrounding villages to see the Swedish plough working."

From the same.

"I have the honor to request that you will be so good as to lend me for a few days a price list or catalogue of Swedish ploughs from which I wish to make a selection, as Mr. A. Sabapathy Moodeliar is about to order 250 ploughs through the Superintendent of Government Farms. Since my last letter the ploughs have been tried here and at another village. A large number of persons, including eight or ten English gentlemen, assembled to witness the working of the ploughs at Bellary; and the ryots were so well satisfied that a large demand has sprung up, one wealthy Reddy asking for twelve. The working of the Swedish plough No. 12 was excellent, six ordinary bullocks turning up a furrow twelve inches deep and ten broad with ease, lifting twice the quantity of earth raised by twelve bullocks with the native plough. The ryots then asked us to try the plough in some red land about 400 yards off, which was very dry and hard, owing to no rain having fallen. This land, they said, their own ploughs could not penetrate; but plough No. 12 cut it up with as much ease as it did the waste regada land, and elicited loud praises from the ryots. I should take great care of the price lists and catalogues, and return them to you in a week's time."

From Mr. A. Sabapathy Moodeliar.

"I beg to state that I am extremely obliged for your kind offer to obtain for me a large number of Swedish ploughs. The exhibition in several villages of the working of the nine ploughs purchased from the Saidapet Farm has excited such an enthusiasm among the ryots that I am receiving almost daily applications from men wishing to purchase similar ploughs, and this very day an influential ryot from Rayadrug Taluk, who has seen one of the Swedish ploughs working at Chakabunda (about 20 miles from Bellary), offers to pay Rs. 10 in addition to the price for one of the ploughs, and some are even offering to hire the use of the plough at one rupee a day. This I mention as indications of the impression made upon the minds of the ryots and their high appreciation of the capabilities of the implement. I have therefore determined for the present to order 250 Swedish ploughs. But as references to the Board, followed by meeting to the Government, would probably involve considerable delay, and I am anxious to meet the urgent demands of the ryots in proper time as I have promised them, I shall, by tomorrow's Mail, order 250 ploughs through my agents in London."

34. Extract from a letter from Mr. V. R. Chakravarti Iyengar :—

"I beg to report on the working of the two Swedish ploughs you were so kind as to place at my disposal, and on the experiments made."

"The first place where the experiment was carried on was in a field, now fallowed, near the late Municipal gate at the road leading to Anantapur. The soil was a stiff clay and was very heavy.

"I tried the large Swedish plough with two stilts, with two pairs of oxen. The land was ploughed well; the furrows made were of 9 by 6½ inches. I raised the wheel to some height that the furrow might be as deep as possible.

"Next, I dispensed with one pair of oxen and only worked one pair of oxen. This pair was quite enough. The furrows were of the same size as former, i.e., 9 by 6½ inches.

"The Native plough was then tried. It was nowhere, when compared to the European one. I made a man sit on the plough that a weight may be added to make the plough go deep; but the plough was not able to make even a slight furrow. The plough used was called pedda madaka (పెద్దమడక), large plough.

"There was a very good assemblage, the ryots having come to Gooty for settlement (Jamabandi). The Sheristadar ordered his Revenue Inspector and ryots to go and see the experiments.

"The second spot wherein I experimented at Gooty was a very stiff clay and gravelly soil near the Travellers' Bungalow, and here, too, the European plough cut the soil to 7 by 6 inches, the Native plough not being able to do anything."

EXCHANGES.

35. The following publications, were received in exchange for those of this department, during the year :—

- Records of the Geological Survey of India.
- Proceedings of the Horticultural Society of India, Calcutta.
- Proceedings of the Horticultural Society, Madras.
- Report of the Department of Agriculture and Commerce, North-West Provinces and Oudh.
- Report on the Cawnpore Experimental Farm.
- Journal of the Royal Society of Edinburgh.
- Journal of the Highland and Agricultural Society of Scotland, Edinburgh.
- Journal of the Royal Agricultural Society of England.
- Journal of the Society of Arts, London.
- Annual Report of the Commissioner of Agriculture, United States, America.
- Agricultural Statistical Reports from the Department of Agriculture, Italy.
- Reports and Journals of the Indian Meteorological Department.
- Report of the Agricultural Society of France.
- Agricultural Statistical Reports, Department of Agriculture, Egypt.

DEPARTMENTAL.

36. Mr. Benson, was on duty only until August, when, the state of his health being so unsatisfactory, he was permitted to go to England on medical leave. Mr. Schiffmayer, did not return to duty from leave on medical certificate, until the beginning of November; he was on duty until the close of the year, but his health has so thoroughly broken down, he has applied for permission to retire from the service. It is greatly to be regretted that these gentlemen have suffered so severely from ill-health. The out-of-door duties of the European officers of this department are planned to avoid the necessity of these officers unduly exposing themselves to the hot sun, but some exposure is unavoidable. Both officers attribute their ill-health partly to the effects of the recently-constructed Buckingham Canal which, by keeping up the water level in the Adyar, prevents during a considerable portion of the year, the proper drainage of a large area of low land, near the farm buildings; and, there cannot be a doubt, but that, from this cause, the locality has been made less healthy. In consequence of the ill-health of Messrs. Benson and Schiffmayer many difficulties have been experienced in carrying on the work of the department; some relief was afforded on the appointment of two Graduates of the School of Agriculture, Messrs. C. K. Subba Row and S. Ramasawmy Aiyer, on probation, the one, as a Deputy Superintendent, and the other, as Experimental Record-keeper. Both young men, have performed their duties very satisfactorily, and have afforded much help in conducting field experiments. *The Office Work* still continues to

increase, 2,187 official letters were issued during the year, and, a large amount of departmental and demi-official correspondence was conducted. The following statement, shows the subjects of inquiry, of a few of the non-official letters received:—

District from which inquiry came.	Subject of inquiry.
Malabar	Reana Luxurians—its culture.
Nilgiris	Casuarina Trees—rearing and management of.
Burmah	Experimental Farm—the proposed establishment of.
Vizagapatam	Eucalyptus Trees—their culture.
Trichinopoly	The Poppy—its uses and culture.
Mysore	Agricultural Experiments—how to be carried out.
Chingleput	Chaff-cutters—most useful kinds.
Bengal	Agricultural Periodicals—titles, prices, and places of publication.
Bombay	Tea Estate—proposals for establishment of.
Rajkot	Water-lifts—different kinds, general utility.
Bellary	Ploughs—for heavy land.
Chingleput	Seed-drills—their construction.
Mysore	Tobacco—identification of variety.
Salem	Harrialli Grass—culture and treatment of.
Mysore	Poultry—the management of.
Malabar	Coffee Estate—formation of.
Travancore	Grasses—suited for general cultivation.
Tinnevelly	Agriculture—improvements generally.
Cuddapah	Double Mhote—its construction.
Bombay	Agricultural Limited Liability Company—proposals for the establishment of.
Chingleput	Egyptian Cotton—its production and treatment.
Kurnool	Cotton—its culture.
Tanjore	Native Husbandry—how to improve.
Travancore	Analyses of Soils—the information afforded.
Tinnevelly	Divi Divi—culture of.
Chingleput	Cattle Disease—treatment of.
Mysore	Native Husbandry—measures to improve.
Salem	Grass Land—management of.
Bengal	Agricultural Study—advice generally.
Poona	Native Husbandry—improvement of.
Tanjore	Native Crops—general defects of.
Chingleput	Tillage—how to economise irrigation water.
Nilgiris	Cattle—improved breed suited for.
Chingleput	Guinea grass—culture of.
Central India	Planter's Friend—information about culture.
Mamiliapatam	English Ploughs—general advice as to introduction of.
Bengal	Tobacco—system of curing.
Tanjore	English Ploughs—what kind to introduce.
Cochin	Agriculture—information generally.
Tinnevelly	Madagascar Paddy—its culture.
Sholapoor	Rotation of Crops—for different soils.
Chingleput	Casuarina Tope—formation of.
Ahmednugger	Indigo—its manufacture.
Bombay	Tobacco—its culture.
Wadhwan	Improved Ploughs—the general construction of.
Salem	Improved Ploughs—what kind recommended.
Chingleput	The Divi Divi bush—its culture.
Indore	Teak Trees—their culture.
Rajpootana	Castor-oil—its culture.
Calcutta	Small Farms—how to establish.
Madras	Cultivation—advice generally.
Nizam Dominions	Cotton—its culture.
Nilgiris	Tobacco—its culture and curing.
South Canara	Liberian Coffee—its culture.
Bellary	Ploughs—for heavy land.
North-West Provinces	Horse-gram—its culture as a fodder plant.
Madras	English Ploughs—what kinds recommended.
Chingleput	Analysis of irrigation water—opinion on.
Trichinopoly	Seed—to be identified.
Central Provinces	Agricultural Publications, Indian—which recommended.

37. The clerks have afforded satisfaction in the performance of their respective duties, now very heavy, and which, for some time, have necessitated unusually long office hours, and frequent loss of authorized holidays. The establishment, is quite insufficient for the requirements of the office; but it is difficult to make any proposals for improvement, in this respect, until something is definitely settled, regarding the future operations of the department.

FINANCES.

38. The following statement shows the income of the department, and the expenditure on various objects, during the year :—

	RS.	A.	P.		RS.	A.	P.
Balance on the 1st of April 1881	2,60,273	13	11	<i>Expenditure—</i>			
<i>Receipts—</i>				General Supervision ...	21,468	0	0
Provincial Grant	20,000	0	0	Saidápet Experimental Farm	10,198	1	5
Surplus Pound Fund	39,781	1	8	School of Agriculture	20,324	11	2
Saidápet Experimental Farm	4,433	14	11	Estate Charges and Improvements	2,810	14	7
School of Agriculture (Fees, Rents, &c.)	558	2	0	Balance in favor of the Department on the 1st April 1882	2,70,245	5	4
Total	3,25,047	0	6	Total	3,25,047	0	6

39. The next statement shows the income, and expenditure, of the Department for the year, and, for the previous three years :—

Items.	1878-79.	1879-80.	1880-81.	1881-82.
	RS.	RS.	RS.	RS.
<i>Receipts.</i>				
Provincial Grant	20,000	20,000	20,000	20,000
Surplus Pound Fund	61,825	44,219	40,924	39,781
Departmental Receipts	4,260	4,212	4,003	4,992
Total	86,085	68,431	64,927	64,773
<i>Expenditure.</i>				
General Supervision	21,631	16,034	17,196	21,468
Saidápet Experimental Farm	14,394	10,773	7,637	10,198*
School of Agriculture	23,476	28,798	15,401	20,325
Estate Charges and Improvements	4,261	3,499	3,531	2,811
Total	63,762	59,104	43,765	54,802

* Includes cost of "Implement Work-shops" and, Imported Aden Stock.

SAIDAPET,
26th July 1882.

(Signed) W. R. ROBERTSON, M.R.A.C.,
Superintendent of Government Farms

APPENDIX.

STATEMENT OF THE ACCOUNTS OF THE MADRAS AGRICULTURAL DEPARTMENT FOR THE YEAR 1881-82.

Expenditure.

				RS.	A.	P.				
I. General Supervision—							RS.	A.	P.	
Establishment	...	...	...	19,935	14	7				
Travelling allowance	...	...	...	404	1	0				
Stationery	...	...	...	287	9	11				
Ploughing Competition	...	...	...	199	7	0				
Contingencies	...	...	...	410	2	7				
Allowance to Surgeon for Medical Charge.				230	12	11	21,468	0	0	
II. Saidápet Experimental Farm	...	...	...				10,198	1	5	
III. Educational (School of Agriculture)—										
Stipends and Scholarships	...	...	...	2,048	15	3				
Establishment	...	...	...	4,128	0	6				
Lecture fees	...	...	...	8,040	0	0				
Prizes	...	...	...	187	0	0				
Books	...	...	...	175	3	2				
Contingencies	...	...	...	1,270	1	9				
Chemicals and Laboratory apparatus	...	...	...	127	5	2				
Botanical grounds	...	...	...	919	14	10				
Veterinary Hospital*	...	...	...	27	5	1				
Maintenance of buildings	...	...	...	1,005	14	6				
Furniture for the Veterinary Hospital	...	...	...	208	4	0				
Laying out College grounds	...	...	...	1,097	6	2				
Repairing and Varnishing College Furniture	...	...	...	1,089	4	9	20,324	11	2	
IV. Estate Charges and Improvements—										
Repairs to Superintendent's Quarters	...	...	...	674	9	2				
Repairs and Improvements to Farm buildings	...	...	...	1,026	8	4				
Repair of Roads	...	...	...	154	3	11				
Sundry Repairs and Improvements	...	...	...	312	15	10				
Brick and Mortar Bridges	...	...	...	103	0	3				
Extension and repair of water channels	...	...	...	317	6	5				
Trees and planting	...	...	...	182	8	9				
Experiment in sub-soil drainage	...	...	...	39	9	11	2,810	14	7	
							54,801	11	2	
Adjusted balance at the beginning of the year				2,60,273	13	11				
<i>Income.</i>										
Provincial Grant	...	...	...	20,000	0	0				
Receipts from the Surplus Pound Fund during 1881-82	...	...	...	39,781	1	8				
Saidápet Experimental Farm	...	...	...	4,433	14	11				
School of Agriculture (Rents and sale of Books, &c.)	...	...	...	558	2	0	3,25,047	0	6	
Balance in favor of the Department on the 1st April 1882							2,70,245	5	4	

*Not yet opened.

(Signed) W. R. ROBERTSON, M.R.A.C.,
Superintendent, Government Farms, Madras.

RESOLUTION—dated 23rd September 1882, No. 2360.

The Board submit to Government, with their review thereon, the Annual Report on Government agricultural operations in the Madras Presidency for the year 1881-82, drawn up by the Superintendent of the Government Farm.

2. *The School of Agriculture.*—There were thirty-nine students in the institution at the beginning of the year, and forty-one at the close. Twenty-six students

were passed out on June 30th, having finished their course of training. Twelve students were supported by Native States and Zemindaries. Sixteen were Government stipendiaries.

3. Referring to paragraph 3 of the Report, the Board remark that the whole services of Mr. Veterinary Surgeon Mills are now at their disposal, as his services have been transferred from the Military to the Civil Department.

4. The school buildings, laboratory, and some of the Veterinary Hospital buildings are now available for use. It is proposed to erect a dissecting room in connection with the Veterinary Hospital.

4. *The Experimental Farm.*—The general work at the Farm has already been reported on, and need not be again criticised here. Mr. Robertson should continue his experiments on manures, as the Board lay great stress on this branch of his investigations. Up to the close of the official year under report, the live stock at the Farm did well. It is a matter for great regret that they were attacked with Rinderpest subsequently, and that one of the finest Aden cows fell a victim to this disease. The increased demand in the country for improved ploughs is a very healthy sign.

5. It is much to be regretted that no tours were undertaken during the year, two of the European officers being on leave for lengthened periods.

6. *Annual Ploughing Match.*—There were fifty competitors for prizes, and the results were conclusive in showing the superiority of the improved plough in the nature of the work done, the rate of doing it, and its cost. The Board note, however, that the cattle drawing the improved ploughs were superior to those generally used, though not stronger than those used in some parts of the country. These ploughs, therefore, can only be successfully introduced in tracts which boast of a strong breed of cattle. Mr. Robertson notes that for localities which have not these advantages, "a smaller plough of the kind can be provided." It is to be hoped that these will be ready shortly, so that, after being duly tested with the smaller and weaker kinds of Farm cattle, their superiority—if they prove superior—to the common country plough may be widely made known.

7. *Seed Distribution and District Experiments.*—4,588 lb. of various seeds were distributed gratis in the districts, of which 1,871 lb. were of Madagascar paddy. Mr. Robertson gives a table showing, from the reports received by him, the results of the experiments made with these seeds. The Board await Mr. Robertson's report on *Reana Lucurians*. It is observed that he considers the grain useful "when roasted," but does not say whether for human food, or for cattle. With regard to his correspondence with the districts, Mr. Robertson should always endeavour to obtain information by which comparisons may be made between the results of the cultivation of farm seeds, and of those indigenous to the country. It is only from this that information can be gathered which may prove valuable in future experiments. He should not fail to chronicle his failures as well as his successes, or these published reports will be of little practical value.

8. *Ploughing Exhibitions in the Districts.*—It is much to be regretted that none of these were carried out this year owing to the presence of cholera. It is at the commencement of the ploughing season that these exhibitions would be most valued by the ryots, and the Board trust that Mr. Robertson will arrange for some to be held speedily, and report results.

9. *Sugar-cane Crushing.*—The reports on the trials in the Bellary District between the Beheea mill and the native mill are very interesting, and the Board are much obliged to Mr. S. Russell for the care with which he carried out the experiment. In certain respects the Beheea mill has a decided advantage, but it cannot as yet be conclusively decided that its introduction would greatly benefit the cultivators. It appears that the mill with which the experiments were made was not a very good specimen, having one of its rollers slightly concave. The experiment, therefore, is hardly a fair one.

10. *Swedish Ploughs*.—The experiments made with these ploughs in the Bellary District, and the results thereof in the large demand made for them by the ryots, are very encouraging, and show that the cultivators are quite ready to consult their own interests in such matters. It is exactly to results like these that the Board look for a test of the value of the Government Farm work, for it is by these results alone that the real worth of all the experiments made can be judged.

11. *Departmental*.—Both the European Assistants were away for long periods in consequence of ill-health, which is much to be regretted.

12. With reference to Mr. Robertson's covering letter asking to be favored with an increased number of copies of his two reports annually for distribution, it is remarked that the Board have lately sanctioned 750 copies of each for distribution, and they consider this number sufficient.

(True Copies and Extract.)

(Signed) R. SEWELL,
Acting Sub-Secretary.

To the Secretary to Government, Revenue Department.

„ Superintendent, Government Farms.

Copy to all Collectors.