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REPORT 12

ON THE
OPERATIONS OF THE DEPARTMENT
AGRICULTURE

MADRAS PRESIDENCY

FOR THE OFFICIAL YEAR

1910-1911



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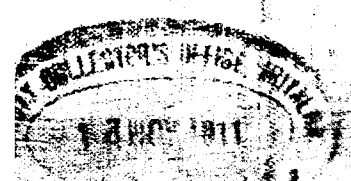
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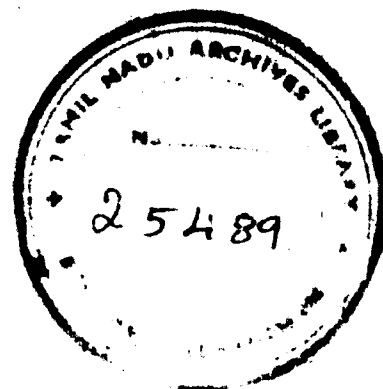
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Report on the College of Agriculture, Coimbatore	..
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REPORT
ON THE
OPERATIONS OF THE DEPARTMENT OF AGRICULTURE
FOR
1910-1911.

I.—STAFF.

I remained in charge of the office of Director of Agriculture throughout the whole year under report. I spent 142 days on tour, and inspected all the agricultural stations, and visited the Coimbatore College on nine occasions. I also attended the annual meeting of the United Planters' Association of Southern India at Bangalore in August.

2. Mr. Sampson availed himself of one month's privilege leave in May, and Assistant Director M.R.Ry. D. Ananda Rao Garu was placed in charge of the current duties of his office. No other changes occurred in the superior staff of the department. In G.O., Mis. No. 65, Revenue, dated 9th January 1911, the second post of Assistant Director of Agriculture was filled up by the appointment of M.R.Ry. K. Ramasastrulu Nayudu Garu, a graduate of the California University on probation. He had been under training on the Coimbatore Farm since April 1910 as a Second-grade Manager. He was posted to work under the Deputy Director of Agriculture, Southern Division, with his head-quarters at Trichinopoly for the present. Assistant Director M.R.Ry. D. Ananda Rao Garu has been deputed for a year's training in farm-management under the Principal on the Central Farm.

Application was made during the year for sanction for the appointment of an European Entomologist. Orders have not yet been received on this. Mr. Sampson having applied for six months leave from 23rd April 1911, the services of Mr. H. Southern, Probationary Agriculturist, were obtained from the Inspector-General, and in order that Mr. Southern might familiarize himself with the work before taking charge, he was deputed to this Presidency in February and worked under Mr. Sampson till that Officer took leave in April. Mr. Southern is now in charge of the Southern division.

II.—SCIENTIFIC AND NATIONAL ENQUIRY.

A.—ENTOMOLOGY.

3. The Imperial Entomologist Mr. H. M. Lefroy visited Coimbatore in May and spent some time there, thoroughly examining the collections. He also examined the records and drew up a programme of work for the year. The monthly reports of the Entomological Assistants are being sent to the Imperial Entomologist for remarks and advice. The department is much indebted to Mr. Lefroy and his successor for their help and advice. The chief outbreaks of insect pests in the year were the swarming caterpillar on paddy in Malabar, the hairy caterpillar on cumbu in South Arcot, the rice bug in South Canara and the Deccan grasshopper on cholam in Bellary. These were all investigated on the spot by the Entomological Assistants, and leaflets prepared in the case of the first three pests and issued on a large scale in the vernacular for distribution in the affected tracts. Some promising experiments on trapping the Deccan grasshopper were made by Entomological Assistant M.R.Ry. Y. Ramachandra Rao. This and other remedies will be tested and demonstrated again this year on a larger scale. The pest is a very serious one, as the whole cholam crop is destroyed in some localities. It is interesting to note that the pest has been the means of increasing the area under Dharwar American cotton which does not suffer from the pest, and has therefore replaced cholam in many villages. Leaflets were also

prepared on the cocoanut beetles, the tobacco caterpillar and the rice hispa. These are illustrated, when possible, to show the pest itself and the remedial methods recommended. These leaflets serve the purpose of dissipating the cultivator's crude ideas as to the real cause of injury done to his crops, but remedial or preventive measures will only be undertaken by a few exceptionally intelligent individuals until we have our own Provincial Entomologist to organize practical field work on an adequate scale.

4. *Sericulture*.—Four broods of Eri silk worms were raised at Coimbatore and an Eri expert obtained from Pusa to teach the local men the rearing of the broods and the spinning of the silk. Experiments are now in progress on a larger scale, from which it should be possible to determine if there is enough money in the industry to tempt people to take it up. The prospects of extending the mulberry silk worm industry are also being investigated. At present this is only carried on in Kollegal, where it is a fairly thriving industry. The heat of the plains has hitherto always proved too much for the worms, but it is possible that success may be met with in the cooler climates of some of our plateaus and hill stations. A few mulberry trees have also been planted in the Botanic garden at Coimbatore, and a brood will be raised there in the cold weather.

B.—MYCOLOGY.

5. Mr. McRae's apparatus has begun to arrive, and his library is expected shortly. The laboratory, however, is still unfitted, and till this is finished practically no research work can be undertaken. Mr. McRae has, therefore, spent most of his time on the palmyra disease and in tours to familiarize himself with the agricultural conditions of the Presidency. He has, however, paid a visit to the Nilgiris, the result of which was reported to Government in my letter of 23rd June 1910. The chief potato diseases found were ring disease and scab of the tubers and early blight of the leaves and stems. A leaflet has been published giving brief instructions for the cultivation of potatoes and describing the appearance of the common diseases of the crop, and the remedial and preventive measures which should be taken to guard against them.

6. Smut on cholam causes a good deal of loss every year. Three smuts are under investigation. The efficacy of a copper sulphate steep for the seed having been proved, this will be demonstrated on a field scale in the Kurnool district in the current year. Smut on paddy, though less severe, is important in view of the large area under paddy. This is also being investigated.

7. An outbreak of the Koleroga of areca palms having been reported from South Canara, Mr. McRae visited the tract with me in September. We found, however, that, owing to the long break in the monsoon, there was practically no disease this year. The people are in the habit of tying protective coverings over the bunches of nuts, and, though this method is very imperfect, it seems to suffice, as the disease is of minor importance at present in South Canara. It is worse in South Malabar. Experiments with spraying will be tried on a small scale there this year. Dr. Coleman has got very good results from spraying in Mysore, where the disease is more serious.

8. *Palmyra disease*.—The continuance of the operations to the end of the year under report was sanctioned in G.O., No. 1726, dated 22nd May 1910. Owing to the extension of the work to the Kistna district, two special Tahsildars were appointed to supervise the work in place of one special Deputy Collector for the two districts. The operations consist of cutting off and burning the heads of the diseased palms.

In January I submitted Mr. McRae's report on the progress of the operations. In spite of the greater activity of the staff, the number of trees cut showed a decrease of 30 per cent. from the numbers cut in 1909. The disease, moreover, is losing its virulence and there are signs that it is being brought under control. Accordingly G.O., No. 979, Revenue, dated 3rd April 1911, sanctioned the continuance of the operations to 31st March 1912. The fact has, however, been brought out that the fungus may remain dormant in the tree for at least ten months and probably longer. This explains the continual reappearance of the disease in localities where all the trees visibly affected have been cut out. This makes it necessary to continue the operations for a far longer period than was anticipated at first. Mr. McRae's main object

was to find out how the disease is spread from tree to tree. His inoculation experiments were very successful, and showed that infection can easily be spread by the tapper's knife. Further experiments will be made in the current year to see if insects can carry the disease from tree to tree. Everything points so far to the probability of human agency being the most important factor in the propagation of the disease.

One of the first requisites for research and teaching is a herbarium of the parasitic fungi of the Presidency. Some specimens were obtained from the Pusa collections, and the additional staff sanctioned in G.O., No. 1225, Revenue, dated 27th April 1911, will enable more rapid progress to be made in the collection of specimens.

9. A short course of Mycology was given to the students of the second year.

10. Some pepper vines were brought to Coimbatore, with a view to obtaining a culture of the pepper fungus, but these succumbed to the unfavourable climatic conditions. It is understood that the tract in the Wynad where the disease was worst is now being put into tea, so that the matter is of less practical importance than before.

The Imperial Economic Botanist paid a short visit to Samalkota in December to see Mr. Barry's tobacco experiments. As the first sown crops had been destroyed by heavy rains, he was unable to visit the lankas.

C.—SEED AND OTHER PRODUCTS SUPPLIED TO AND RECEIVED FROM OTHER PROVINCES AND ABROAD.

11. The two new Barbados canes Nos. B. 3412 and B. 6450 grew vigorously and have been planted out on a larger scale this year. Fiji B, one of the two canes imported last year, and planted at Taliparamba, has turned out to be a very high class cane. Setts have been planted on several of the other farms in the current year. The other is less promising, and having a very soft rind would suffer severely from the attacks of jackals and boring insects. Some of the Burma orange plants imported last year having arrived in a very bad condition, and died after planting, a fresh consignment was obtained and distributed. Among other new importations the American "Iron" and "New Era" cowpea both promise to be useful crops. The new maizes and cumbus continue to do well.

12. *Supplied to other countries*.—Selections of Madras sugar-canes were sent to the Punjab this year and the Central Provinces last year. The latter are reported to have done very well. Some Tinnevely cotton seed was sent to the Philippines, and a selection of melon seeds to Western Australia. Seed of Red Gogu (Bimilipatam jute) was supplied to the Fibre Expert, Eastern Bengal and Assam.

III.—SCIENTIFIC AND LOCAL ENQUIRY UNDER PROVINCIAL DIRECTION.

A.—BUILDINGS AND LAYING OUT OF FARMS.

13. The construction of a dairy at the Agricultural College was sanctioned in G.O., No. 822 W., dated 3rd August 1910, at a cost of Rs. 11,000 and the Mycologist's bungalow in G.O., No. 67 W., dated 21st January 1911, at a cost of Rs. 16,990. G.O., No. 1088 W., dated 17th October 1910, sanctioned Rs. 4,500 for additions and alterations to the fittings in the Mycological laboratory, and G.O., No. 641 W., dated 16th June 1910, Rs. 21,050 for furniture for and alterations to other parts of the College. A portion of the water-supply scheme was sanctioned in G.O., No. 362 W., dated 16th April 1910, at an estimated cost of Rs. 24,900 and ornamental book cases for the Library at a cost of Rs. 8,000.

It is a matter for regret that none of these works have been finished up to the time of writing. The pot culture house sanctioned in August 1909 is still incomplete. Plans and estimates for the remaining portion of the water-supply scheme and for an installation of vacuum and pressure pumps for the Chemical laboratory were submitted to Government in Board's Reference No. 218, dated 26th January 1911. Orders have not yet been received on them. The lease of 20 cents of land in the Central farm to the Urban Bank and Stores, Limited, for the construction of a branch stores, was sanctioned in G.O., No. 855, dated 24th March 1911. More land

being required for building quarters for the subordinate staff the acquisition of 9.56 acres of land was sanctioned in G.O., R.D. No. 1024, dated 7th April 1911. The scarcity of water is a hindrance to tree planting, but this is being pressed on as fast as possible. The avenue on the Lawley road already looks well. The Botanic garden has been very skilfully laid out by the Government Botanist. Plants and seeds are freely distributed from it to the staff and students who compete with each other in gardening and beautifying the exteriors of their houses. Almost every house and hostel has a garden of some sort, the general effect of which goes far to mitigate the raw appearance of rows of new buildings.

14. No new farms have been opened during the year, and no important new works executed on the existing farms.

B.—CROPS.

15. *Agricultural stations—Sugar-cane introduction.*—The Red Mauritius cane continues to make rapid progress in South Arcot. The Ashy Mauritius and Barbados 208 are also doing very well here, especially on dry land. The East India Distillery Factory encourages the cultivation of sugar-cane by supplying tops for planting free of cost. The result of this year was that the demand for tops for planting was greater than could be supplied even from the large area under cultivation, and over 2,000 acres have been planted. As in Gódvári the local canes have practically disappeared, no less than 96.2 per cent. of the area under cane in South Arcot last year being Red Mauritius cane. From experience gained in South Arcot it may now be stated confidently that, with the superior canes now available, and good cultivation and management, India can produce refined sugar at a price capable of competing with Java sugar. Large areas of suitable land, with an ample supply of sub-soil water, being available, we may expect to see South Arcot become the leading centre of the sugar-industry in Southern India. The following figures show the progress made in the vicinity of Nellikuppam:—

	ACRES.
1907 (Red Mauritius canes sent from Melrosapuram)	...
1908	145
1909	409
1910	876
1911	2,260

16. On the West Coast, starting from an area of 5 cents of Red Mauritius cane planted on the Taliparamba farm in 1907, the area under Red Mauritius cane has increased to 21 acres, 15 of which are in South Canara. Most of this is made up of small experimental plots of only a few cents in extent, cultivated by people who are trying the crop for the first time. I visited many of the experimental plots last year, and found that everywhere the new canes had done much better than the local canes, which they will supersede here as elsewhere for jaggery making in a very short time. In Malabar, sugar-cane cultivation is a new introduction, but it has made a good start and should now spread rapidly. This will greatly benefit the district, as, apart from the large profits of sugar-cane cultivation, the introduction of this crop compels the people to pay more attention to manuring their wet lands, to the benefit of the succeeding paddy crops.

17. *Experiments with sugar-cane.*—Further experience at Samalkota, Palur, Coimbatore and Taliparamba with this crop confirms the opinion already formed that want of attention to drainage is the greatest defect in the ryot's methods of cultivating sugar-cane. The same point was demonstrated on a large scale by Mr. Neilson at Nellikuppam. It is interesting to note that the Hospet cane-cultivators, whose crops are the best in the Presidency, fully realize this, and drain their fields well. In large paddy flats it is difficult to secure good drainage, and cultivators are slow to grasp the need for it. An excellent article on the subject was contributed by Mr. Hilson to the *Agricultural Calendar*. A number of ryots near the Samalkota farm were persuaded to plant their crop in rows this year, after the farm practice, but it is more difficult to induce them to drain their lands.

18. *Ground-nut introduction.*—The progress made with this crop in South Canara is disappointing. The people are very skilful wet land cultivators, but almost entirely ignorant of dry cultivation, and cannot realize the necessity of rotation. Hence they sow the crop on the same land year after year till it fails,

when they give it up in disgust. The fact seems to be that though the crop grows very well, they at present prefer to spend their labour and manure on their wet lands. The want of a ready local market for the produce has also proved a formidable difficulty. Practically all the available wet land being already fully cultivated, the slowly increasing pressure of population on the land must compel the people of the West Coast to pay more attention to their dry lands, when they will find the value of ground-nut as a rotation crop. This fact gives importance to the experiments on the dry lands at Taliparamba which have shown that, with a rotation including crops like ginger, ground-nut and chillies, dry land can be kept under continuous cultivation with a good profit. Ginger, first introduced, on the Taliparamba farm, has become very popular in N. Malabar. At present the dry lands are only cultivated occasionally, and allowed to lie fallow for several years afterwards.

19. *Ground-nut experiments.*—The abnormal rains of October spoilt the varietal experiments on the monsoon crop. The rotation experiments, designed to find out the best crop to grow with ground-nuts, confirm the former results and show that a mixture of ground-nut with cumbu or tenai (*Pennisetum typhoideum*) or (*setaria italica*) more profitable than a crop of ground-nuts alone. An occasional change of the cereal also seems beneficial. At Taliparamba an application of two cwts. of Superphosphate per acre showed a net profit of Rs. 14 per acre. Where wood ashes are available in quantity this is the best manure on the West Coast.

20. *Cotton—(a) Improvement of seed and seed distribution.*—The year's working has afforded most encouraging proof of the soundness of the lines on which this work is being conducted. In Kurnool the white seeded Tellapatti and in Tinnevely the arunganni variety have been taken up for cultivation on a large scale, as they have been proved to be more profitable as well as better than the local mixtures. In Kurnool 3,000 lbs. of seed were sold in 1909, 18,700 lbs. last year, while during the present season about 50,000 lbs. of seed, sufficient to sow about 3,500 acres, will be available and it is reported that there will be a keen demand for this. Conservative and backward as the Kurnool cultivators are, they fully appreciate the value of our seed. This work will be expanded as rapidly as possible, so as to produce annually an amount of seed sufficient to influence the whole cotton crop of the district. In Tinnevely 119,600 lbs. of seed sufficient to sow over 14,000 acres, were sold at 43 ppts. It is found that the cultivators realise that they get better crops from arunganni and therefore keep seed for next year from their own crops. The acts where seed depôts were first opened have, therefore, become pure Karunganni acts, and the depôts are now being opened in new places each year. Striking testimony has been obtained from three of the largest export Firms to the improvement in the general crop effected by these measures. In two cases new ginning stories have been opened in tracts where Karunganni has been established, on account of the good quality of the cotton obtainable there. One Firm writes, "there has been a marked improvement in the quality of Tinnevely cotton during the last 7 years, especially in the Tuticorin Circle". This is one of the tracts which have been converted into pure Karunganni tracts by our seed distribution of the last few years.

Another Firm says, "We have, during the last few years, noticed that a relatively very good cotton is received from places near Koilpatti. We have no hesitation in concluding that your experiment has been highly satisfactory in its results. This pure Karunganni cotton to all intents and purposes is the best we can wish for".

These operations were conducted at a total net cost to Government of Rs. 5,040-4-10 during the year. The sale of the lint constitutes the greater part of our receipts, so that the cost of the operations depends on the course of the cotton markets. Prices were very high during the year.

21. *Cotton improvement.*—The lines on which this work is proceeding were described in paragraph 22 of my last year's report. These remain unchanged, and time will be required before any definite results can be shown. For the details of the work reference must be made to the scientific reports of the farms. It will be seen from these that many good selections are under trial, and in some cases these retain their good ginning percentage from year to year. An excellent report was received from the Imperial Cotton Specialist on four of the Koilpatti selections.

22. *Cultivation*.—In the previous year 2,100 acres were sown with the drill but I pointed out last year the great difficulty of introducing an entirely new system of cultivation. This has been exemplified by the check which drilling has received this year. No rain was received till the middle of November, and many ryots who had arranged to drill their cotton were afraid to wait any longer and sowed their seed broadcast in the dry soil. When the rains came, 1,637 acres were drilled in a week. Though the drilled crops were sown very late in the season, and about a fortnight later than the broadcasted crops, they fared much better in the end, and this demonstration of the superiority of the drilling method, even in adverse circumstances, should encourage many more to try it this year. In several villages round the Koilpatti farm drilling is firmly established, and there is little likelihood of the people going back to their old system. Seventy acres of cumbr were also sown with the drill this year. In Kurnool a few more large ploughs were sold. What is wanted in the Ceded districts is not so much new implements, as more energy and intelligence on the part of the cultivators in the use of the excellent indigenous implements which they have already. None the less, the large iron plough will spread to the Nandyal valley in course of time, as the full benefit of deep ploughing is not realized in the first year.

23. *Cambodia cotton*.—Cambodia cotton promises to fully realize the hopes expressed in my last year's report. The current year's crop was estimated at 38,000 bales. It is being advertised as much as possible by the department and a large stock of seed is held for supply to those who wish to try it. It is interesting to note that the Madras mills are now making a much finer quality of cloth than before from Cambodia cotton.

There is a keen demand for Cambodia both here and in England. Its value will be best seen from prices quoted in Madras on June 20th—

	In Madras.	In Liverpool per lb.
Cambodia	Rs. 228 per candy of 500 lbs.	7-62d.
Northerns	Rs. 190 per candy (=6-08d.)	...
Tinnevellies	Rs. 207 per candy (Tuticorin) (=6-62 per lb.)	7-06d.
American cotton	...	7-79d.

From this it will be seen that Cambodia is worth more than the best Madras cottons and almost as much as American cotton. This is interesting, in view of complaints made in other parts of India that there is no market in India for superior cottons. This is not the case here.

The cotton is now being grown in Tinnevely, Ramnad, Madura, Coimbatore, Trichinopoly and South Arcot. Efforts are being made to extend it to the western taluks of Bellary where Dharwar American cotton, a similar type of plant, though inferior to Cambodia, has made great strides in the last few years.

At present it shows no signs of deterioration, and as the yield per acre is four to five times that of the indigenous cottons, yielding a profit of Rs. 150 and more per acre, it will soon be found in every part of the country and should effect a revolution in the local cotton industry. It is grown on garden lands with well irrigation, and in some cases on wet lands. It does not, therefore, displace the indigenous cottons to any appreciable extent, being grown on a different class of land. The Government Botanist is conducting experiments on scientific lines at Coimbatore to see if it can be improved by crossing with Bourbon. A severe attack of stem borer spoilt this year's experiments, but the Government Botanist considers that the habit of the plant and the shape and size of the bolls are proved to be Mendelian factors, and that useful characters have been combined in at least two plants. This work has very great possibilities as each variety has useful characters peculiar to itself. Could these be combined, a variety superior to Cambodia would be the result. The marvellous spread of Cambodia illustrates the immense value to the country of a good new variety of cotton.

24. *Paddy experiments—Varieties*.—At Palur a variety from the Central Provinces called Raseadam shows signs of being a useful early season paddy. It is of better quality than the Madras early paddies. Seed is being distributed this year. Several other new varieties are improving as they become acclimatized. Banku has given good yields at Samalkota, but it still tends to split

up into different forms, and requires constant selection to keep it up to the best type. The effect of changed climatic conditions on imported varieties is always very noticeable at Coimbatore, where many different kinds of paddy are grown for instructional purposes. Enquiries are often received for a variety of paddy suited to swampy lands. Experiments conducted for several years at Samalkota show that Kalabhaira, an imported paddy, thrives fairly well under swampy conditions, though of course like all swamp paddies it produces inferior rice.

25. *Planting methods*.—Mr. Hilson's Samalkota report brings out clearly the fact that, without actual measurement of the distances between plant and plant, spacing experiments are never accurately carried out. Hence too much importance cannot be attached to the results of the field plots comparing different spacings. Inspection of the crops on the ground, however, always reveals the fact that singly planted fields have a greener appearance and show more vigorous growth than fields planted in the usual way. Watching these experiments for several years, it is noticeable that as soon as the whole non-experimental area of a farm is planted with single seedlings raised in thinly sown seed beds a striking improvement is seen in the whole crop. At Coimbatore this year the average yield for the whole area of wet land on the farm was 3,000 lbs. of paddy per acre, a very good yield, while the average yield for the district may be put at 2,000 lbs. A special effort was made last year to popularize single planting in Tanjore. Three subordinates were sent on lecturing tours, and large numbers of Tamil leaflets were distributed. A large area roughly estimated at 7,000 acres, was planted in this way last season and many more landowners, while they are afraid to adopt the system at once, are reducing their seed-rate and sowing their seed-beds more thinly. This brings home to them the wastefulness of their present seed-rate, and by degrees they will adopt the single planting system. I and Mr. Sampson visited many of these experimental plots and we found them all successful, most of them promising to yield far larger crops than the surrounding fields. I am informed from independent sources that there is hardly a village in the delta without its experimental plot of singly planted paddy.

A saving of about Rs. 3 an acre in seed alone can be effected by single-planting, and better crops realized. This is now so well known, that the only objection to the system which Mr. Sampson and I met with on our tour was that the land was exhausted by single-planting. This is the best proof that the crops are larger. These efforts are being continued in the current year in Tanjore, and in the neighbourhood of all the Government farms.

26. *Manuring and concentrated manures*.—The pati-mannu experiments in Kistna confirmed the view formed before, that, in most cases, potash is not required on paddy lands, while superphosphate gives a good profit. Wide-spread interest has been aroused in the subject of concentrated fertilizers by the demonstration plots, and leaflets circulated on the subject, and the Presidency manure works are taking advantage of this by opening depots in the Kistna for the supply of the artificial manures recommended by the department.

The experiments at Samalkota and Coimbatore also show the value of superphosphate for paddy. Two cwt. per acre at a cost of about Rs. 8 give a considerable increase in the crop and yield a substantial net profit. Plain bone-dust has also given good results at Coimbatore. In view of the rapidly developing fish oil industry on the West Coast, the high yields of paddy at Coimbatore manured with fish manure are important, as the fish guano left after extraction of the oil is, if anything, a better manure than the whole fish. It is also a good manure for garden crops.

27. *Green manuring crops*.—A comparison of tables VI, VII and VIII in Mr. Wood's Coimbatore report reveals the fact that no manure applied in quantities which it is possible to use in ordinary practice, equals the effect of green manures grown on the land and ploughed in. *Sesbania Aculeata* (Dhaincha), yielded 12 tons of green manure per acre at Palur and 13½ tons at Coimbatore. This amount could not, of course, be applied to the field in which it grew, but part of the green stuff was cut and carried to adjacent fields. The plots in which *Sesbania* was grown yielded no less than 4,435 lbs. and 4,200 lbs. of paddy respectively. Great success has been attained in the current year with wild indigo. The hard outer coat of the seed hinders germination and only a small percentage of the seed sown comes up in the first year. By slightly abrading this coat by treading it in sand with bullocks,

or by other mechanical means, excellent crops of this valuable green-manure have been raised. The cost of growing a green manure crop varies from Rs. 1-8-0 to Rs. 5 per acre, while an equal application of green leaves brought from outside would in practice be prohibitive in cost, and impossible to procure for large areas. The much smaller amounts actually used by the cultivators are estimated to cost from Rs. 10 to Rs. 25 per acre. To popularize the practice of growing green manures among the cultivators, stocks of sunn-hemp, indigo, wild-indigo, *Sesbania aculeata* and other leguminous plants were laid in, and 77,150 lbs. of seed were sold without difficulty to the public. This is sufficient to sow 6,210 acres. Most of this was sold in the Tanjore and South Arcot districts but a beginning is being made this year in Madura, where there is a great need for leaf manure.

During the last three years the hot weather showers in these districts have been an almost entire failure. In spite of this, many people already realize the value of green manuring, and there is a ready sale for all our seed of green manuring crops. It is interesting to note that both single-planting of paddy and green manuring have long been practised in specially intelligent localities, but are unknown to the rest of the people. By demonstration and advertisement and the supply of seed of green manuring crops, it is hoped to extend them in time to every district in the Presidency. No other improvements at present advocated by the department are so certain of success, or hold out the same immediate inducements to the cultivator to take them up.

28. *Second-crop experiment in Gódvári.*—To avoid the waste of water which occurs now in the interval of two months which occurs between the harvesting of the first crop and the planting of the second, an attempt is being made to find a variety of paddy which can be sown in November or December. Yerrabakkala, a Nandyal variety, gave some promise this year and will be tried on a large scale next year. Of the local varieties Garika sannavari is still the best, though not so good as it is when sown later.

29. *Miscellaneous crops.*—At Koilpatti the ridge and furrow system in the monsoon season again gave better crops. This is being taken up slowly by the cultivators. Success has been achieved with the South Arcot onions introduced here. In South Arcot the bulbs for planting are raised from seed, and a better crop is realized in the way than when bulbs from a bulb crop are planted. An attempt is being made, with prospects of success, to introduce this practice. Seed is being imported for sale.

A promising experiment was tried at Coimbatore of growing green manures on garden land, and ploughing them in as a manure for the succeeding crop. It is found that the green stuff readily decays after irrigation. If further experience confirms the utility of the practice it should give an impetus to garden cultivation, which requires heavy manuring with bulky organic manures to keep the land in a fertile condition.

30. *Seed distribution.*—The success of the distribution of cotton seed encourages us to hope for equal success with other crops. A beginning is always made from a single plant selected in the field, and it is surprising how quickly a large stock can be worked up from a single plant. In 1910 a single plant of paddy was selected at Coimbatore. Its produce will suffice to sow 30 acres in the coming season. Some promising strains of cholam have been worked up in the same way at Hagari. The raising of pedigree strains of seed of all the crops, the testing of them by careful field experiments, and growing the approved strains on a large scale for sale to the cultivators will assume a more and more important place in the work of the department as time goes on. This is work which the ryot is incapable of doing for himself. It requires trained judgment, time, money and the most minute attention to details, besides a thorough knowledge of the crop. It has the further advantage that there is never any difficulty in getting the cultivators to buy good seed. The adoption of good seed involves no extra expense, and no change in their cultivation methods. On all the farms selections are made every year from the chief crops and in time improved strains of all the crops should be available. Special attention is paid to teaching the subject to the students, as seed selection must be carried out in each local area for the locally grown crops.

31. *Ponnalur tank.*—In G.O., No. 1368, Revenue, dated 26th April 1910, it was directed that the experiment of growing irrigated dry crops under the Ponnalur tank should be given up. In future no restriction is to be imposed as to the nature of the crop to be grown under the tank, water-rate being levied according to the crop grown. A return received from the Collector shows that in fasli 1320, 174.63 acres of first crop and 11 acres of second crop were under paddy compared with 57 acres in fasli 1319. The only dry crop cultivated on a large area was ragi on 153 acres. As the salt is washed out of the soil, more land is likely to be put under paddy.

32. *Hindupur Agave plantation.*—In G.O., No. 965, Revenue, dated 3rd April 1911, my proposal to give up the Hindupur agave plantation was approved. Some figures regarding the growth of the plants and the average production of leaf and fibre per acre have been obtained, but the cost of extraction of the fibre by hand is prohibitive. The only chance of success for the industry seems to lie in the invention of a small portable fibre machine suitable for use by unskilled labour. I cannot hear of any suitable machine. The great fluctuations in the fibre market, moreover, are unfavourable to the investment of capital in the industry.

33. *Pepper.*—The vines continue to improve with good cultivation. The most important piece of definite information gained in the year is that lime and leaf mould gives the best results of any of the manures tried. Fish manure is also very good. After a heavy crop such as the vines bore last year, it is a common thing for many to die out. Very few deaths, however, have occurred. This shows the effect of good cultivation.

34. *Tobacco experiments.*—One hundred and fifty acres were planted with exotic tobaccoes by Mr. Barry. The lankas were inspected by Mr. Hilson in March. The season was very unfavourable, the early seed-beds being destroyed time after time by heavy rains. The latter part of the monsoon was a complete failure. In spite of this, good crops were obtained on part of the land. The most interesting feature of the year's work was the success of the plots green manured with sunn-hemp and wild indigo. I have asked Mr. Barry to furnish me with more information about the curing and marketing of the crops of previous years, but this has not been received up to the time of writing.

35. *Visitors to farms.*—The Collectors of Malabar, South Canara, Tinnevely, Ramnad, Madura, South Arcot, Kurnool and Gódvári were asked to instruct some of their Tahsildars to visit the farms in or near their districts at suitable times, taking with them a few of the best cultivators of their taluks. These visits were very successful, especially in Malabar, where the visitors attended in large numbers and showed great interest in the Taliparamba farm. On all the farms a fair number of visitors are received. The farm staff all make frequent visits to the surrounding country to talk to the people about the improvements introduced on the farms, and invite them to pay the farm a visit.

36. *Implements.*—The implements referred to in last year's report, viz., the Archimedian screw water-lift, the Scinde plough and the triangular harrow are increasing in popularity.

Eighty-one implements were made to order at Palur. The manufacture of the Archimedian screw lift has been taken up by local firms in Tanjore and Trichinopoly. It is a most effective instrument for lifting large quantities of water up to a maximum height of four feet. It can, therefore, be used to remove the excess of water from low-lying paddy fields during the rainy season, a common cause of damage to the crop in Tanjore. Messrs. Burn & Co. and Messrs. Massey & Co., both turn out a light iron plough which does good work on loamy soils. Efforts have been made to popularize these and a fair number have been sold. Wooden ploughs wear out fast, and in many places it is becoming difficult to get wood at a reasonable price. Sugar-cane mills are being introduced into Malabar and South Canara.

A great want is a really cheap and effective winnower. The grain is easily threshed by cattle power but winnowing is often a tedious process when there is no wind. Several firms have had their attention directed to the subject. The English digging fork is in common use among potato growers in the Nilgiris. It is more efficient than the mamutty for digging up root-crops, such as sweet potatoes, turmeric, etc., and efforts are being made to introduce it at Samalkota.

37. *Publications.*—Only one bulletin was issued during the year, No. 52, by Mr. Lonsdale, Agricultural Expert to the Court of Wards on the Home Farm, Sivagiri. Short leaflets in the vernaculars, illustrated where necessary, are found more useful, as they are more likely to reach the cultivators.

During the year under report the following leaflets were issued:—

- (1) Groundnut cultivation in the West Coast (Leaflet No. II of 1910).
- (2) Method of preparing preserved ginger (Leaflet No. III of 1910).
- (3) Hairy caterpillars (Leaflet No. VI of 1910).
- (4) Swarming caterpillar pest (Leaflet No. VII of 1910).
- (5) Conservation of cattle urine (Leaflet No. VIII of 1910).
- (6) Experiences of single seedling planting of paddy (Leaflet No. IX of 1910).
- (7) Useful facts learnt from experimental cultivation at the Palur agricultural station (Leaflet No. X of 1910).
- (8) Useful facts learnt from experimental cultivation at the Taliparamba agricultural station (Leaflet No. XI of 1910).
- (9) Light traps (Leaflet No. XII of 1910).
- (10) Individual manuring of paddy (Leaflet No. XIII of 1910).
- (11) Useful facts learnt from experimental cultivation at the Central Farm (Leaflet No. XIV of 1910).
- (12) Useful facts learnt from experimental cultivation at the Koilpatti agricultural station (Leaflet No. XV of 1910).

They are distributed partly to visitors to the farms, and partly by the farm staff during their tours. Sometimes they are sent to Collectors of districts for distribution through village officers. Notes on subjects of interest are communicated to the English and Vernacular Press from time to time. Judging from the number of enquiries received, some of these have succeeded in attracting public attention.

In G.O., No. 1780, Revenue, dated 31st May 1910, the agricultural calendar was ordered to be printed in all the vernaculars of the Presidency, and supplied free to all village officers. A copy is also sent free to each elementary school. Each year the opinion of District officers and Educational authorities is invited on the form and contents of the calendar. Many useful suggestions have been received, and as a result of this independent criticism, the calendar was issued in a more handy form this year. The frontispiece is an excellent illustration of the Agricultural College, the work of the Principal, Mr. R. Cecil Wood. Apart from the free distribution, a fair number of copies have been sold to the public, and enquiries, evidently prompted by a perusal of the calendar, are being received in large numbers. There can be no doubt that it serves its purpose of bringing the work of the department to the notice of the cultivators, and advertizing the new crops, methods and implements. Great care is taken to make the articles simple and practical.

As directed in G.O., No. 2493, dated 29th July 1910, short summaries of the useful information contained in the scientific reports of the agricultural stations were prepared and issued in English and Vernacular.

C.—AGRICULTURAL EXHIBITIONS AND CATTLE SHOWS.

38. Agricultural exhibitions and cattle shows were held at Madura, Tirupur, Berhampur, Pithapuram, Ellore, Kottavalasa, Ongole and Kottacheruvu during the year.

After careful consideration I am of opinion that the conclusions arrived at by the Agricultural Committee of 1889 still hold good, and that in the absence of the conditions which make these shows a success in England, they are of no practical value. No improvement in the cattle of any tract has ever been observed in consequence of these shows. I have submitted a separate report on this subject, and the matter is still under consideration.

Agricultural associations.—As stated in last year's report, all Collectors were consulted as to the utility of these associations. Their replies showed a consensus of opinion that the associations were moribund, and had never done any real work. I have submitted a full report on the subject separately. The associations have been mainly composed of amateurs, and the few ryots who were induced to join them have never shown any effective interest in them. The formation of these associations was premature. Official pressure can never make them a living reality. In order that they may succeed, there must not only be a practical scheme for securing material advantages by combination, but the leading spirits in the associations should be enthusiasts in the cause.

IV.—BOTANY.

39. The report of the Government Botanist is attached to this report, and has already been submitted to the Board. I will, therefore, only allude briefly to one or two points here. Most of the time of the Government Botanist was occupied with teaching. The work on cotton, referred to in paragraph 23 above, was delegated to the Botanical Assistant M.R.Ry. T. S. Venkataraman, who has shown great aptitude for the work. An important fact brought out by the Government Botanist's analysis of samples of cotton seeds received from different parts of the Presidency is that the seed ordinarily available to the ryot is a mixture, containing several varieties of varying utility. This explains the invariable success of the distribution of pure seed. It is probable that the same is true of other crops, all of which contain if not always separate varieties, still, a number of strains of varying quality and productiveness. The separation out of the best strains and propagation of them for seed supply thus offers a wide field of usefulness for the department.

The work on *Hibiscus Cannabinus* and *Mirabilis* has served its purpose of training the Economic Assistant in Mendelian work, the fruits of which we hope to realize in an improved variety of cotton, and other crops later on.

The botanic garden is a brilliant illustration of what can be done to beautify the most unpromising surroundings. This excellent object lesson has stimulated the interest of the students in Horticulture, and it is hoped that most of them will take away with them from the College a genuine interest in gardening.

V.—CHEMISTRY.

40. The feature of the work of the Agricultural Chemist for the year has been the great increase in soil samples sent in for analysis by private individuals and in letters from cultivators asking for advice. By his work on the gases evolved from land occupied by the paddy crop Mr. Harrison has opened up a field of enquiry into the method in which the paddy plant obtains its food, which is of the first importance. This is being pursued as time permits. Regarding the pati-mannu experiments Mr. Harrison writes that "the experimental and demonstration plots have, on the whole, yielded such encouraging results that ultimate success appears certain". The primary object of these experiments was to find a substitute for the pati-mannu. They have, however, resulted in the collection of useful information about the manuring of paddy in general. I have asked Mr. Harrison to embody this in a Bulletin which will be issued shortly.

VI.—AGRICULTURAL EDUCATION.

41. The maximum number of students provided for is 60, 20 of whom are admitted each year for the three-year course. The first batch of students admitted in 1908 finished their course at the end of the year under report and were examined for their diploma in Agriculture by Mr. D. Clouston, Deputy Director of Agriculture, Central Provinces. Fourteen students out of the sixteen who appeared for the examination obtained the diploma. The report of the Examiner, which has been submitted to Government, was a very gratifying testimony to the thoroughness of the teaching at the College. The students were reported to have a wide and accurate knowledge of agriculture, and the benefit derived from the thorough training in field work which all the students obtain on the farm was apparent in the Examiner's report. I have no doubt that the students whom the College is now turning out are thoroughly qualified to set about the improvement of the agriculture of their own districts. About half of them are the sons of landowners, whose object in coming to the College is to acquire a knowledge of practical farming which will enable them to manage their own properties to better advantage than before. Only a few men will be required to fill vacancies in the department each year. It is, therefore, important to maintain a high proportion of students of the landowning classes who do not require Government appointments. It is to be noted that in another Province where a much larger number of students is turned out annually, most of them belonging to the literary classes, the difficulty of providing the passed students with employment is already acutely felt, and the demand is being put forward that preference should be given to agricultural diplomates for appointment in other departments. From the experience gained at the Saidapet College it is certain that an Agricultural College which is degraded into a training

school for Government officials in the Revenue Department soon ceases to attract the best class of students, men connected with the land. The teaching also loses touch with practical agriculture, because the real aim of the students is to pass an examination qualifying themselves for employment, and not, as it should be, to gain a practical working knowledge of agriculture which they can use for the improvement of their estates. The examination of the second year students in science was conducted by Mr. Warth, the Burma Agricultural Chemist, and Mr. Southern, Acting Deputy Director of Agriculture, Southern Division, with the help of the College staff. The results were very satisfactory, as all the students passed. The third year students made two tours, one in the Tamil country and one in the Telugu. Perhaps the chief value of a scientific training in agriculture is the insight it should give into the principles underlying diverse agricultural practices. Our students would be imperfectly trained if they merely learnt the methods of growing crops practised at Coimbatore. The value of these tours therefore, lies in the opportunities they afford to the students of seeing new applications of the fundamental principles they have learnt at the College. This fixes the principles themselves in their minds and teaches them to understand and respect the well-tested methods worked out by the ryots. A thorough understanding of an existing system of cultivation is necessary before any attempt can be made to improve it. The students made good use of their tours, and Mr. Clouston, the external examiner in agriculture, specially remarked on the wide knowledge of agriculture they had gained during these tours. The students are examined individually twice a year by the Deputy Directors of Agriculture on their field work. This has a stimulating effect on the students and useful practical suggestions are often made by the Deputy Directors for the improvement of the practical training.

42. It was originally intended that each of the ten hostels, accommodating six students in each, should form a separate mess, and each hostel was accordingly provided with a separate kitchen and dining room of its own. In practice it is found that the students have not time to do their own house-keeping, and, prefer to have their meals provided for them. A joint mess has therefore now been arranged for with two scales of food, costing Rs. 8 and Rs. 12 per mensem, respectively, to suit the different pecuniary circumstances of the students. In exceptional cases students who desire to do so will be permitted to provide their own food. A surprising improvement is always observed in the health and physique of the students, due to good food and regular work in the fields.

It is hoped to keep in touch with the old students of the College. A students' union has been formed by the students themselves. The intention is to have one or more annual reunions at the College and publish a journal occasionally on topics of common interest.

43. The above summary of the year's work shows that all the officers of the department have worked with zeal throughout the year, and that their efforts have been crowned with a great measure of success. The subordinate staff continue to improve in efficiency, as may be seen from the rapid expansion of the work in the districts, which is carried out entirely by them. Space does not permit mention of the particular pieces of good work done by each member of the department but I cannot refrain from saying that the duties of the Principal of the Agricultural College, which call for much tact, and patience and organising ability, in addition to a great deal of continuous hard work, have been discharged most successfully by Mr. Cecil Wood.

44. *Non-official visitors.*—Six visits were paid from non-official visitors during the year. Their remarks have been forwarded to the Board. As the term of office of most of them has expired, I have submitted a fresh list of names for appointment as honorary visitors.

45. *Publications.*—The number of publications received from other countries and other Provincial Departments was as follows:—

	Indian.	Foreign.
Periodicals	30	74
Bulletins	40	235
Reports	210	25

MADRAS,
26th June 1911.

M. E. COUGHMAN,
Director of Agriculture.

APPENDIX I.

THE ADMINISTRATION REPORTS OF THE AGRICULTURAL STATIONS DURING THE YEARS 1910-1911.

ADMINISTRATIVE REPORT OF THE DEPUTY DIRECTOR OF AGRICULTURE, NORTHERN DIVISION.

I have the honour to submit herewith the administration reports on the agricultural stations under my control with a short account of the district work connected therewith for the year 1910-1911.

2. *District work.*—This work, which has assumed much larger dimensions this year, may be conveniently divided under the four following heads:—

(1) Distribution of seed of selected varieties of local cotton grown on the farms in the Ceded districts, with the introduction of the heavy iron plough in those black cotton soil tracts where its use is as yet unknown.

(2) Distribution of good varieties of sugarcane, with the introduction of improved methods of cultivation and cleaner methods of preparing jaggery.

(3) Introduction of improved methods of cultivating paddy.

(4) Distribution of seed of exotic varieties of maize and sesam; of Cambodia cotton in suitable tracts and of good seed of local crops grown on the farms.

3. *Cotton.*—The greater proportion of the work under this heading has been done at Nandyal farm, where an Assistant Farm Manager has been specially deputed to attend to the work.

Two seed farms, comprising a total area of 34.60 acres, in Koilkuntla taluk were sown down with farm seed, and a total quantity of 25,000 lb. of seed, 18,700 of which were sold from Nandyal farm and the remainder from Hagari and Bellary, were sold this year.

It is worthy of note that in the case of the Nandyal seed, the ryots are taking enough seed to sow out the whole of their cotton area for the year and in a number of cases are carefully reserving seed from this crop for the next season.

With regard to implements, owing to the lateness of the jonna and cotton harvests no demonstrations could be held this year and only two ploughs were sold.

Assistant Farm Manager M. Raghavalu Nayudu was in charge of this work at Nandyal until the 23rd November 1910 when he was transferred to Coimbatore and his place was taken by Assistant Farm Manager K. Narayana Aiyangar who continued until the end of the year.

4. *Sugarcane.*—The centre for this work is Samalkota farm. Owing to the poor growth of the canes this year on this farm and to the fact that in the delta distribution from ryot to ryot was going on, the demand for B. 208 was not great this year.

Three thousand and five hundred canes of B. 208 and 1,070 of Red Mauritius were however disposed of.

The work of distributing new varieties of cane is comparatively easy; it is however a much more difficult matter to introduce improvements in the methods of cultivation.

The two points the department lays most stress upon are planting setts in rows instead of broadcast and deep-draining. One hundred ryots in the neighbourhood of Samalkota farm were induced to plant small areas in this manner and a total area of 118 acres was so planted. The attention given to drainage however was very slight and though in a few instances the benefit of planting in rows is apparent to the ryot he is by no means convinced of the advantages of deep-draining.

Fourteen demonstrations of the improved method of making jaggery, which simply consists in straining the juice through a sieve before boiling, adding lime water to the juice to prevent inversion and removing the scum as it appears, while boiling, were held.

The ordinary ryot does not view this method with favour; the removal of the scum entails a certain decrease of the outturn of jaggery and until the standard of quality required is raised generally the progress of the introduction of this method is likely to remain slow.

Assistant Farm Manager N. Sektaramasawmy Nayudu with the exception of 8 months privilege leave was in charge of this work throughout the year.

5. *Paddy.*—The introduction of improved methods of cultivation, i.e., sowing seed-beds thinly, at the rate of 1 Madras measure per cent. of bed per 5 acres of crop and transplanting seedlings singly is being advocated in the neighbourhood of all the farms save Bewada.

The Bellary Agricultural Station.

Season.—The season was on the whole favourable. The early south-west monsoon rains were sufficiently heavy to enable "mungari" sowings being done in good time and this coupled with the good rains received during the north-east monsoon made conditions for the growth of these crops exceptionally favourable.

The heavy rains of September, however, somewhat retarded the growth of the korra-cotton and pure cotton crops; in spite of this, however, on the better portions of the farm these crops did fairly well.

2. **Crops.**—(a) *Early.*—Owing to the favourable season reported above, heavy yields have to be recorded.

Pure korra in Field No. 2 W. yielded on the average at the exceptionally high rate of 1,084 lb. grain and 1,283 lb. straw, while mungari jonna in Fields Nos. 6 o and 7 gave an average acre yield of 1,420 lb. of grain and 8,020 lb. fodder; yields in both cases far above any previously recorded for the farm. The highest individual yield for korra was 1,825 lb. grain and 1,925 lb. fodder from plot No. 16 manured with safflower cake + super, and for mungari jonna 2,490 lb. grain in the case of red No. 1 and 15,900 lb. fodder in the case of red No. 2.

Korra in Korrapathi was only up to the average.

(b) *Late.*—In growth these were only fair, the yields, however, are not to hand as harvesting is still in progress.

3. **Experimental work.**—The permanent tillage plots and the cotton thinning experiments have both been given up, and the two series of manural plots are being cropped now to test the residual effect alone of the manures applied.

Comparative plots of early sorghum varieties were again laid down. The results this year, apart from the fact that the yields are higher, differ somewhat from previous years, kagi jonna in point of fodder, being beaten by both red No. 2 and yellow No. 1. On the average of six years' yields, however, this variety shows itself to be the best, and as it seems to be a distinct acquisition to the district, steps will be taken to bring about its introduction.

Further details of these experiments are given in the scientific report.

4. **District work.**—(1) *Cotton seed.*—Two thousand four hundred and ninety pounds of seed were disposed of this year, most of which was sold at the farm itself, only a small quantity being sold along with the seed from Hagari farm from the godown hired for the purpose. The total quantity of seed distributed from Bellary and Hagari together was 5,380 lb. to 58 ryots in 12 different villages.

(2) *Improvement in paddy cultivation.*—A number of ryots in Moka were induced to try single planting. Though none of the seedlings planted were grown in thinly sown seed-beds, where single planting was adopted and transplanting done in the right season, the yields were satisfactory and the prospects of the gradual spread of this improvement seem hopeful.

Six ryots tried the experiment, the total area transplanted being 72·63 cents.

(3) *Green-manure.*—A small quantity of *Sesbania* was distributed to two ryots in Moka village.

(4) *Sugarcane.*—Twenty canes each of Red Mauritius were distributed towards the end of the year to three selected ryots in Hospet.

The number of visitors to the farm this year was 203.

(5) **Staff.**—Assistant Farm Manager, W. Raghavaiahari, was in charge of the farm throughout the year with the exception of 1½ months when he was on privilege leave, the farm during that period being in charge of Assistant Farm Manager, V. S. Narayanasawmi Aiyar.

The Nandyal Agricultural Station.

Season.—The season this year was even less favourable than last, although the total rainfall recorded was less.

More than half the fall reported was received between the middle of August and the end of October, and this in the first place delayed the sowings of cotton and sorghum and secondly made it necessary for partial resowings to be done in both of these crops.

2. **Crops.**—The above-mentioned crops continue to occupy the main attention of the farm staff.

The yields of the former are not to hand, but taken all over the farm, the growth of the crop was poor, though the selections were somewhat better than the main crop. Compared with the crops outside, however, the farm crops were good, this being due in some cases to better seed and in others to the fact that the ryots sowed their seed mixed with horsegram, which, contrary to their expectations, grew luxuriantly to the detriment of the cotton.

As regards selection work a less satisfactory state of affairs has to be reported. In the Herbaceous selections a number of plants of the indicum type were noted and it was thought at first that merely some admixture of seed had taken place. Further examination, however,

brought to light some plants which exhibited characters of both of these species, and it was concluded that crossing had occurred. A number of these plants were marked and the produce of these will be collected separately and sown out next year and the behaviour of the resulting plants noted.

The yields of sorghum owing to the bad season are only moderate. The selections sown out this year were completely spoiled and a fresh start will have to be made.

3. **Experimental work.**—Comparative tests of the five sorghum varieties, cheruku patcha, red No. 1, venna mudda, vanka and nilwa were again made this year. Cherukupatcha once more proved its superiority and it is evident that of these varieties this is the most suitable for the district. The others will therefore be discarded and further work with this crop will be confined to the improvement of this variety by selection.

The indigo rotation experiment was continued. Except that the crop was the best grown since the laying down of this experiment, there is, however, nothing further to report.

Manural plots were laid down to test the effect on sorghum of an application of bone-char-super and sheep-folding. The results obtained only emphasise the fact that the season has been a bad one, and do not give any information.

4. **District work.**—(1) *Cotton.*—The work of distributing farm cotton seed is becoming increasingly important. The ryot of this district has now been convinced that in buying farm seed he is obtaining a better article than he would get from a local merchant, with the result that a quantity of 18,700 lb. of seed was sold this year as compared with 3,000 last year.

It is hoped that if enough kappas from seed distributed this year can be bought, about double the quantity will be sold next year.

Two seed farms in total extent 55 acres were rented in Koilkuntla taluk and a depot was opened in the village of the same name.

Next year the number of seed farms will be increased to 7, an area of about 200 acres being thus devoted to the production of seed for distribution.

It is satisfactory to note that in buying this seed from the department the ryot in most cases takes enough to sow out the whole of his cotton area, thereby reducing the risk of his seed getting mixed.

(2) *Cotton soil ploughs.*—Owing to the lateness of the season this year, it was not possible to hold any demonstrations in March. Two ploughs were, however, sold.

(3) *Improvements in paddy cultivation.*—A small plot of land was rented for the purpose of demonstrating single planting. The land, however, had not long been brought under wet cultivation and the yields were small, though the results were in favour of that method.

This land has been given up and a fresh plot taken; the owner has however continued the experiment and has planted the greater part with single seedlings. Seventeen ryots in all have tried this method on small areas.

The number of visitors to the farm this year was 200.

5. **Staff.**—Assistant Farm Manager, K. Narayana Aiyangar was in charge of the farm until November, when he was placed in charge of the cotton work, vice Assistant Farm Manager, M. Raghavalu Nayudu, who was transferred to Coimbatore, Assistant Farm Manager, T. S. Venkataramier, taking his place at the farm.

The Bezvada Agricultural Station.

The unsuitability of this farm for experimental purposes has already been referred to. This year's working has emphasized the fact.

2. **Season.**—The total rainfall for this year was 23·5 inches greater than that recorded for last year and 18 inches above the average.

From the middle of June to the middle of November almost continuous rainfall has to be reported.

The early crops were badly affected and the fields ploughed in preparation for late jonna crops became so foul with weeds that they were got ready in time only with great difficulty, a short break in the monsoon in September permitting of this being done at some expense and with the help of outside labour. The labour and seed expended however were lost, since from the middle of that month until the end of the rainy season the fields were never in a fit condition to put foot upon, most of them in fact being under water for a fair proportion of this period.

Altogether the season was most unfavourable and any leeway that had been made up in the eradication of weeds has been lost.

3. **Crops.**—(a) *Early.*—The early crops sown were sazza, carjonna (fodder sorghum), cambodia and local cottons, maize and dry paddy.

Sassa suffered severely, more particularly the exotic variety *Louwveldt*. After deducting the area spoilt by waterlogging the yields which are lower than last year are as follows, Transvaal 1,310 lb. per acre, Local 1,273, *Louwveldt* 695. The results show that, even in a bad year like the one under report, Transvaal *sassa* at least is able to hold its own against the local variety.

Carjonna.—This crop was somewhat stunted in the lowlying portion of the field, but has yielded fairly at the rate of 11,000 lb. of dry fodder per acre. The quality of the fodder however is poor.

Local cotton.—A small area was sown down with this crop to compare the yields with the late sown crop. Though somewhat stunted in growth, it was otherwise healthy and promises to give a fair yield.

Cambodia cotton.—Periodical sowings were made, beginning early in July, with the object of finding out the best time to sow this crop. The earliest sown plot was a long way ahead of the others and looked like giving an excellent yield, until in the latter part of September it was completely spoilt by heavy rains. It has since picked up but none of the plots are likely to yield much.

Maize.—A similar experiment was tried with this crop. Here, however, it was evident that the earliest sown had not been sown early enough and none of the plots did at all well.

Dry paddy.—This was tried in field No. 2-A, but the field became water-logged and the crop failed to germinate.

(b) *Late*.—The late crops were *carjonna* ratooned, a small area of late sown fodder *jonna* in place of the grain crop which failed, local cotton, *cambodia*, horsegram, Bengalgram and maize.

The fodder crops were stunted and gave a very poor yield.

Cambodia.—This crop was sown early in September, but when only about 6 inches high the field was flooded and except on the higher levels the crop for a long time was very poor. Latterly, however, it picked up somewhat and is expected to give a fair yield.

Local cotton.—The cotton was sown very late towards the end of November instead of the beginning of October. It however grew very luxuriantly but was very late in flowering, and picking is just beginning.

Both horsegram and Bengalgram in spite of late sowing and insect attack did fairly well. The former gave a maximum yield of 565 lb. per acre and an acre average yield of 415, while the latter gave 625 lb. and 340 lb., respectively.

Maize.—Both the exotic varieties, Brazilian flour corn and Hickory King, did well and a fair number of good sized cobs were obtained. While green these were eagerly sought after by the residents in the town, but in the district as yet they have not made much headway.

4. *Experimental work*.—With the exception of the experiments mentioned above, none was done.

5. *District work*.—This is of very small dimensions, though every effort is made to interest the people of the district in the farm. Small quantities of seed of *Cambodia*, Transvaal *sassa* and of exotic maizes were distributed.

The number of visitors to the farm was 80.

6. *Staff*.—Farm Manager S. Raghunatha Row was in charge of the farm until the 24th August 1910, when he took leave on medical certificate for two years. Farm Manager R. Ramasawmy Aiyar took over charge from him and continued until the end of the year.

The Hindupur Agave Plantation.

The history of this plantation was given in detail in the report for last year, and with the exception of the cutting figures for this year there is little further of importance to be added.

2. *Season*.—Plentiful rains promoted the growth of grasses and weeds and made it difficult to keep the plantation clean, but otherwise the season was favourable.

3. *Operations*.—(1) *Planting*.—A few of the nurseries showed signs of overcrowding, and these were thinned, the thinned plants being transplanted out in a small area of about 20 cents prepared for the purpose.

(2) *Retting*.—A quantity of 88½ lb. of *Sisalana* was retted in the vat at Bellary farm. The operation was a long one, taking in all 51 days, though the greater portion was ready in 43 days. The percentage of fibre, however, was high, being as much as 4·3 per cent.

(3) *Cutting*.—Besides the usual two cuttings of *Sisalana* in September and January, a small cutting of *A. cantala* was made and the percentage of fibre tested 9·4 lb. of green leaf gave 1½ lb. of fibre, which works out at the low figure of 1·3 per cent.

The percentage test of *Sisalana* gave the usual figure of 3·5 per cent.

The cutting figures for the last four years have been tabulated and are shown below:—

Year.	Average number of leaves per plant.	Average weight per leaf, lb.	Weight of leaf, lb. per acre.	Yield of fibre, lb. per acre.
1907-1908	15	·7	10,038	351
1908-1909	24	·68	12,384	430
1909-1910	13	·53	6,842	240
1910-1911	15	·47	6,258	219

From these figures it will be seen that the average yield of leaves per plant per annum is 17 and the average weight per leaf ·6 lb. The percentage figure has remained fairly stable at 3½ per cent. and the number of plants per acre is 900. Calculating from this basis it may be taken that the average annual yield on these soils will amount to, in round figures, 300 lb. per acre.

Poling is not yet general as out of the 342 plants in this area only 12 have poled up to date.

4. *Somandapalle*.—This plantation is free from disease, but a number of the plants have been uprooted by wild pigs.

The plantations this year have been under the charge of the Assistant Farm Manager, Bellary.

BELLARY,
12th April 1911.

G. R. HILSON,
Deputy Director of Agriculture, Northern Division.

ADMINISTRATIVE REPORT OF THE DEPUTY DIRECTOR OF AGRICULTURE, SOUTHERN DIVISION.

I have the honour to forward the administration report of the district work in the Southern Division and of the agricultural stations under my charge.

2. During the year I have been able to spend only 155 days away from head-quarters on tour and I find owing to the large increase in correspondence, already reported, that more and more of my time has to be spent in office work. Now, however, that M.R.Ry. Ramasawmynayudu has been appointed as Assistant Director in this division, I hope to be relieved of much of this.

3. The increase in correspondence in my office has mainly consisted of enquiries from private individuals, which often need careful consideration before answering and occasionally require that some officer should be sent on inspection to the applicant's lands before replying.

4. Except for a period of one month (10th May to 9th June) when I was on privilege leave, I have been in charge of the Southern Division for the year under report. M.R.Ry. D. Ananda Rao, Assistant Director of Agriculture, Northern Division, was in charge of my office during my absence on leave.

5. All the subordinate officers under me, both executive and clerical, have worked well and enthusiastically and have done their utmost to cope with the work, which, without extra assistance, is almost too rapidly developing.

DISTRICT WORK.

6. Now that the work of the several agricultural stations has begun to give some results, the scope of the department has considerably increased, and, in order to bring proved improvements to the notice of the ryot, much more touring has become necessary for the officers attached to these agricultural stations. In some cases it has been found necessary to place officers on special duty in particular tracts. The several lines of work will be dealt with separately.

7. *Cotton improvement*.—Details of this work have been separately submitted with my letter B.O.C. No. 267, dated 21st April 1911, and can be summarized as follows:—

Sale distribution of Karunganni cotton seed.—In all 119,600 lb. of seed sufficient to sow 14,096 acres were sold at 42 depots, mainly in the Ottappidaram taluk of Tinnevely district. Only 960 lb. of seed remained unsold. It will be seen the quantity sold is less this year than last. This is due to two causes: (1) In many places the ryots had retained seed for their own use from crops raised with seed distributed last year; (2) Seed depots were pushed out much further east this year into a new tract of country and were reduced in places where pure Karunganni is now established. The ryots in this new tract had in most cases already arranged with dealers for their seed supply. Seed stocked at such places could not be moved to where the demand was keen, owing to the tracts through the black soil being impassable at this season.

The distribution of Karunganni cotton seed seems to have already caused considerable improvement in the cotton of the tract. Two firms are opening gins and presses at centres in the tract in which the department have been working, owing to the excellent quality of cotton, which they have noticed to come from there during the past two or three years. The Tuticorin Chamber of Commerce state in answer to an enquiry that they have noticed an improvement in the quality of Tinnevely cotton during the last two years, but that they are not unanimous in stating whether this is due to the distribution of seed by the department or to favourable seasons. This is corroborated both by Messrs. Ralli Brothers' and Messrs. Volkarts' agents at Tuticorin. As a matter of fact, last year was a most unfavourable season as already reported in last year's administration report of the Koilpatti agricultural station.

The area under drill cultivation also shows a reduction, owing entirely to the season. This year the rains were very late and fearing that they would miss the season altogether, many ryots, who had intended sowing with the drill, sowed broadcast in the dry soil on the chance of the crop coming up when rain fell. When rain did come in November, it was general everywhere and the whole drilled area of 1,637 acres was sown practically within a week. This would have been quite impossible last year owing to the shortage of trained coolies. Thus though both the quantity of seed distributed and the area sown with the drill are less than last year, there has been a steady advance. One very encouraging feature this year is the success met with by adopting drill cultivation for cumbu (the black soil cereal of this tract). Seventy acres were this year sown by ryots with cumbu with the drill and in almost every case, these were the best crops in the village, often giving double the yield of broadcasted crops. By thus expanding the usefulness of the drill to other crops, it is hoped that this will effect a much more rapid expansion of the drill cultivation of cotton. Farm Manager M.R.Ry. A. V. Tirumurganatham Pillai was in charge of the whole of this work as well as of the Koilpatti agricultural station. The range of work was divided into three circles, the Western Circle being in charge of Assistant Farm Manager (now acting Farm Manager) K. Sankara Aiyar; the Eastern Circle in charge of Assistant Farm Manager T. R. Venkatasami Rao; and the Northern Circle which was worked by Assistant Farm Manager V. Dhanakoti Raju attached to the Koilpatti agricultural station assisted by the rest of the staff there.

The introduction of Cambodia Cotton.—This is now a common garden crop in the south and it is estimated that this year's crop will be 33,000 bales of 400 lb. Being a very superior class of cotton and a very paying crop, the department has endeavoured to introduce this further afield. Three thousand five hundred and forty-three lb. of seed were sold—2,353 from the Koilpatti agricultural station and 1,190 lb. from the Palur agricultural station. Inspection of Cambodia crops was confined to that grown in the Trichinopoly and South Arcot districts. Assistant Farm Manager V. Dhanakoti Raju toured through the Musiri division of Trichinopoly district; Assistant Farm Manager Kolandasami Pillai (attached to the Palur agricultural station) toured in the Ariyalur division of Trichinopoly and in the Kallakurohi taluk of South Arcot; and Assistant Farm Manager K. Ramanatha Aiyar (attached to the Palur agricultural station) toured in the Villupuram division of the South Arcot district, giving advice and instructions to intending cultivators of this crop. A start has now been made in both these districts. In South Arcot 40 acres of this crop have been grown this year mainly on garden lands. If this is successful, and prospects seem to point in that direction, it will be a great thing for that district, as it will form a remunerative crop on "groundnut sick" land. It has not been possible to inspect crops elsewhere, but the Tahsildar of Pollachi, Coimbatore district, reports that trials with Cambodia in his taluk are very promising and many ryots are anxious to take up this crop next year. The work of cotton improvement has been met from an allotment of Rs. 31,900-12-8 and the receipts for the year were Rs. 22,989-3-8.

The cultivation of greenmanure crops on wet land.—Experiments in this direction were first started by the Home Farm Superintendent, Sivagiri estate, under the Court of Wards. Considerable knowledge has been acquired since then on the agricultural stations. The question is of special importance in the Southern Division where the use of leaves, collected from waste and forest lands, for manuring wet lands has been an immemorial custom. The expansion of dry cultivation and the reservation of the forests for their protection has reduced the quantity of leaves available, while the area of wet cultivation has increased, and until now, no substitute has been found. This shows the importance of this subject. The department has therefore been purchasing seed of suitable greenmanure crops for sale distribution and about 77,150 lb. of seed have this year been sold sufficient to sow 6,210 acres. This is the second year since the commencement of the sale of greenmanure seeds and it can be at once seen that it will be impossible for the department to manage a very much greater extension of this work. Already the demand for these seeds is greater than what the department have been able to supply. Latterly therefore, with the object of inviting the competition of merchants, the seed has been sold at a price calculated to give a profit of 10 per cent. Thus the work costs the department nothing. Up till now this line of work has been mainly confined to Tanjore and South Arcot districts, while a few preliminary trials have been made in the North Arcot district. In the Cauvery delta, the work of distribution has been very ably carried out by Farm Manager M.R.Ry. C. Narayana Aiyar who has been on special duty in the Tanjore district for the last two years. In South Arcot the work has met with signal success under the guidance of M.R.Ry. S. Subramania Aiyar, Manager of the Palur agricultural station, and the two Assistant

Farm Managers under him. Assistant Farm Manager K. Ramanatha Aiyar of the Palur agricultural station has done the preliminary work of arranging demonstration plots in the North Arcot district with very satisfactory results. Arrangements are now being made under the Periyar irrigation for plots of sunnhemp as a greenmanure crop to be grown by selected cultivators in some 25 selected villages, and it is hoped that very shortly this will solve the much felt difficulty of manuring this large tract of land newly brought under wet cultivation. The arrangement of this work is being carried out by Farm Manager M.R.Ry. C. Narayana Aiyar.

Introduction of better varieties of sugarcane.—In the sugarcane tract around the Palur agricultural station, the Red Mauritius cane introduced by the department has not only to all intents and purposes, ousted the local cane, but has led to a considerable expansion of the cultivation of this crop, as the following comparison of last and this year's figures show:—

	1909-10.	1910-11.
	ACH.	ACH.
Total area under cane ...	467	923
Area under Mauritius cane ...	353	888
Area under local cane ...	114	35
	PER CENT.	PER CENT.
Percentage area under Mauritius cane ...	75.6	96.2

When one considers that the area under sugarcane in India has been practically stationary for the last ten years and that there was a considerable decline in the area when compared with that of the previous ten years, an increase of nearly 97 per cent. in one year is most satisfactory. The expansion of this area is mainly due to Mr. Neilson, Manager of the East India Distilleries and Sugar Factory, who not only has introduced this as a garden crop on lands under wells, but has also assisted in the introduction by supplying sets to intending cultivators and has shown that much better crops can be grown by paying more attention to the detail of manuring, irrigation and drainage.

On the West Coast considerable effort has been made to introduce Red Mauritius canes. From an area of 5 cents planted in 1907 on the Taliparamba agricultural station it is estimated that the area this year will be 21 acres in the two districts of South Canara and Malabar—an increase of 420 per cent. Though the total area seems small, it must be borne in mind that sugarcane is practically a new crop to Malabar and it is only being grown on very small areas of a few cents each for trial. One hundred and forty-one people in Malabar have been supplied with sets for this season's planting from the Taliparamba Agricultural Station, and the total area estimated to be planted from this works out to a little more than 2 cents each. In South Canara sugarcane is a known crop, but most of the cane area is far away from railway communication. Thus though many people are trying these canes, the plots are at present quite small, and it is estimated that in all there are 15 acres of Mauritius canes in this district this year as the result of this and last year's planting. The red Mauritius canes have done remarkably well everywhere on the West Coast and there seems every possibility of a much greater extension as soon as the supply of sets available increases. The canes are larger and sturdier than any of the local varieties, they are proof against jackals and give a much better quality of jaggery. The work of supplying sets, supervising planting and giving advice has been very ably carried out by Farm Manager M.R.Ry. M. Govinda Kidavu and Assistant Farm Manager K. Unnikrishna Menon, both attached to the Taliparamba Agricultural station.

8. Single planting of paddy.—This simple improvement in wet land cultivation has been advocated everywhere to wet land ryots, wherever the officers of the department have toured. A special effort was made in the Cauvery delta before last season when three officers of the department were deputed for a period of two to three weeks each to tour through a taluk and to hold meetings at all important villages, distributing vernacular leaflets to those interested. These tours seem to have had a remarkable effect and there is hardly a village where this improvement has not been tried, usually with great success. As a result of this and previous demonstrations, a general reduction in the seed rate is found throughout the district. More care is given to the preparation and manuring of the seed beds, as it is being realised that the improvement is as much due to healthy well-grown seedlings, which are given sufficient room to develop after transplanting, as to planting them singly. Many people now only use a seed rate of three Madras measures (about 8 lb.) per acre in place of the old mamul rate of 42 to 45 Madras measures (about 110 to 120 lb.) for planting their samba crop of red or white sirumani. The following three officers were deputed for this Tanjore tour: Farm Manager M.R.Ry. S. Subramania Aiyar to Shiyali, Farm Manager M.R.Ry. C. Narayana Aiyar to Nega-patam and Assistant Farm Manager K. Sankara Aiyar to Kumbakonam taluk. In North Arcot, South Arcot and Tinnevely, people are also trying this improvement with success. In Malabar, also, many people are reducing their seed rate and planting two to three seedlings. Here the varieties do not tiller so well as on the East Coast and economic planting is advocated rather than single seedling planting.

9. Introduction of improved implements.—Around the Palur Agricultural station, the triangular harrow has proved to be a most useful implement. In several villages, it has become a practice to harrow the Vadan samba crops (sown dry and ultimately irrigated), the ryots getting

implements made from the pattern of those lent from the Agricultural station. The Egyptian plough obtained from the Deputy Director of Agriculture, Seind, and reduced in size to suit the South Arcot cattle, is admirably adapted to the sandy loams of the South Arcot district and is now being extensively made for the Palur Agricultural station and sold to applicants. The possibility of opening a small factory for making these implements is under consideration.

10. *The Archimedian screw water-lift*.—Several of these have been made and supplied to the ryots of the Tanjore district where there is a large scope for their introduction for low lifts, either for irrigation or for drainage.

11. *General seed distribution*.—This part of the work of the agricultural stations has developed considerably, mainly at Palur, where a much larger variety of crops are grown. The following figures show the number of people supplied with seeds from the agricultural stations in this division:—

	Palur Agricultural station.	Taliparamba Agricultural station.	Koilpatti Agricultural station.
Number of people supplied.	693	253	104
Quantity supplied ..	Seed 29,796 lb. Sugarcane .. 30,000 sets. Implements .. 81.	Seed 4,580 lb. Sugarcane .. 42,705 sets. Pepper 20,000 cuttings.	Seed 4,414 lb.

The Palur Agricultural Station.

The season.—This has not been good. The total hot weather showers in April and May only amounted to 0.18 inch. The south-west monsoon opened well with 2.72 inches in the first half of June, by the aid of which the dry land cereals were sown. The young crops suffered much, as after that practically no rain fell for a month. These were however saved from complete failure by a fall of 2.37 inches in the second half of July, by the aid of which groundnuts were interplanted in the cereal crops. The varietal plots of groundnuts were not however sown until August. The August-September rains were about normal in quantity, but these were continuous in the second half of August when 5.18 inches were recorded on 12 rainy days. The cereal crops were then in flower and much of the pollen was washed away before the grain could set. The second half of October was exceptionally wet, 12.48 inches being recorded. The low-lying dry lands were all submerged and two acres of red gram and all the groundnut varietal tests were spoilt. November rainfall was very much below the average and for the last four months of the year no rain was recorded against an average of over 8 inches for the period. The total rainfall for the year was only 33.37 inches against an average for the previous 4 years of 47.59. For wet land crops the season was favourable. The early June rains were utilised to sow sunnhemp on wet land for the samba crop on double crop lands. The first crop season was excellent and for early planted samba crops the season was good, though the shortage of rain in November and the entire absence of rain in December and January decreased the outturn to some extent and were not favourable to late planted crops. Except for the heavy rain in October, the season has been excellent for sugarcane. No rain at the planting time and light showers throughout the early growing period were all favourable, while the dry conditions after the heavy rain of October did much to prevent water logging.

2. *Rainfed crops*.—Dry land cereals have given poor crops owing to the unfavourable commencement of the season. Groundnuts on dry land have given yields considerably higher than the average, except where the crops were sown late and were subject to water logging. Of other dry crops on dry land, fodder cholam has given exceptionally good crops when sown with the south-west monsoon. Crops sown in the second season failed owing to drought. Maize and introduced Cumbu sown in the early season gave only fair yields and the weather conditions were very unfavourable for a mixed crop of cumbu, sunnhemp and redgram grown as a trial to find out how most economically to grow sunnhemp for seed for greenmanuring. The cumbu suffered from drought, the sunnhemp was harvested at the time of heavy rain and much of the seed was spoilt, while the redgram damped off from excessive water logging of the soil.

3. *Crops on garden land*.—Since no rain fell in April-May, the irrigated groundnut crop was poor. Of the irrigated crops in the monsoon season, Cambodia cotton has done well. Onions failed and kadai kanni (*Panicum miliaceum*) gave a fair crop. Of the other varieties of cotton under trial, a variety of Bourbon, probably "Spence" cotton promises very well. Georgia Upland introduced from Georgia State last year is fair and Sea Island is moderate, the last being sown too late in the season.

4. *Crops on the wet lands*.—Sugarcane varieties have done much better than usual, owing to the excellent drainage facilities given to the crop from the time of planting. Several of the recently introduced varieties were brought down from Samalkota and were cultivated here this year. One of the most noticeable features of the crop was the residual effects of a crop of

Sebania aculeata which was grown for greenmanure and ploughed in for the preceding paddy crop. The paddy crops this season have been remarkably good. The various experiments with manuring, spacing and testing of varieties have been continued. The most useful work in connection with wet cultivation has been the development of the practice of growing greenmanure crops both on single and double crop lands to be ploughed in as manure for the paddy crop. Yields of Samba paddy this year from plots manured with greenmanure are nearly double those obtained in 1908, a year of very good crop. The following are two examples:—

Plot Number.	1908. Yield per acre.	1909. Yield per acre.	1910. Yield per acre.	Remarks.
63 (F)	LB. 1,296	LB. 1,613	LB. 2,336	Greenmanured for last two crops with naripayaru or narikaramani (a variety of <i>Pithecellobium sesbaniaefolium</i>).
65 (B) and (C) ..	1,416	1,580	2,596	Greenmanured with <i>Sebania aculeata</i> for last two crops.

That the effects of a greenmanuring crop will last for more than one year is shown by the yields obtained in another field from which the following acre yields of paddy have been obtained:—

Year.	Yield per acre.	Manure.
1908	LB. 924	Half candy groundnut cake.
1909	2,086 (Transplanted)	Sebania green manure and half candy groundnut cake.
1910	1,668 (Broadcasted)	Ten loads compost * per acre.

* Weeds, etc., collected on the farm and rotted in a pit.

These figures show the importance of this question and the effect of these trials are likely to be far reaching, especially in such tracts where the forests can no longer supply the demand for green leaves.

5. *Seed distribution*.—The total quantity of seed distributed this year from this agricultural station was—

Groundnuts	7,620 pounds.
Paddy	9,140 "
Greenmanure seeds	11,286 "
Miscellaneous cereals	1,750 "
Sugarcane sets	30,000 sets.

6. *Miscellaneous*.—The extension of the seed store commenced last year has been completed and a disused indigo vat which is within the boundaries of the agricultural station, is now being converted into a rest house for Indian visitors. One new pair of bullocks was purchased for the station and one animal was sold. Two bullocks died from obstinate constipation.

The Koilpatti Agricultural Station.

Season.—The season this year has not been favourable and though the total rainfall has been above the average, the distribution has been bad. The hot weather showers, except for two days (April 12th and 15th) when 1.47 and 2.12 inches, respectively fell, consisted of very light showers of less than $\frac{1}{4}$ of an inch. These latter did much more harm than good by preventing the cotton of the summer crop from setting. In the south of the district, conditions were much worse even than on the farm, since in many places no rain worth the name fell and the summer picking of cotton was a complete failure. The south-west monsoon season (June-August) is usually dry, the 35th year average rainfall for this period being 3.11 inches. In the year under report the rainfall amounted to 8.19 inches. Not only was this rain not wanted, but it was actually harmful. This is the season when ploughing is done and weeds such as Hariali grass (*Cynodon dactylon*) are kept in check by this means. A heavy rainfall such as this had the effect of causing this grass to spread more rapidly the more the land was ploughed. Fortunately, the red soil crops were sown this year with the aid of the rains in the end of August instead of being left until September, the usual sowing month when this year only 0.35 inch fell. During September, the crops sown in August suffered much. The rains for the black soil were this year very late and no sowing rain fell until the middle of October, a time when usually the bulk of the black soil sowing is completed. Thus after the cereal crops were sown, the sowing of cotton was not commenced until November, and, owing to frequent light showers, which prevented an entrance into the fields, most of the cotton was not sown till near the end of the month. This has made the cotton crops a month later than usual. Rain stopped on November 18th, when 5.22 inches were recorded and since then until the end of the year only .02 inch has been recorded against

* At Sattur.

the 35th year average of 6.66 inches. The heavy rain of the 18th which fell within a period of 2½ hours did much damage. None of the field drains or streams were able to carry off this water and bad washes were formed in all directions. This has interfered much with the experimental work on the station. The only point in favour of this north-east monsoon season was that the rainfall was general throughout the district. The failure of the latter part north-east monsoon has resulted in a short crop throughout the district, especially in the south where the sowing season is later than in the north. Of the three main black soil crops, viz., cumbu, fodder cholam and cotton, cumbu has yielded about 1/3rd, fodder cholam about one-fourth, and the yield of cotton will be only about 1/5th of the average. Matters would be serious in this tract but for the present high prices of cotton.

2. *Black soil crops.*—On the agricultural station, cumbu and cotton have grown well, but fodder cholam and pulses have been practically failures. The success of the cumbu has been entirely due to the method of drill cultivation adopted, and it is encouraging to note that similarly good crops have been obtained in the districts where ryots have adopted this method of sowing and subsequent inter-tillage. We can now say that given an adequate sowing rain, it is quite possible to raise a normal cumbu crop without the aid of subsequent rain by the adoption of drill cultivation. It is doubtful, however, whether, in a normal season, there would be any appreciable difference in the yield between the two methods, drilling and broadcasting. It is too soon yet to speak of the yields of this year's cotton crops, since there is still danger of losing much of the crop, either by aphids, or by unseasonable weather. Last year's yields, however, are now available and show that in a season very similar to this the acre yield obtained was more than that of a 'normal' crop (viz., 27.24 lb. of lint per acre), though not as high as the yields obtained on the farm in the three previous seasons.

The various experiments and demonstrations were continued both on the black and red soil blocks and where results have been obtained, these have confirmed those of previous years. Cambodia cotton has been grown on the red soil under irrigation.

3. *Buildings improvements.*—The seed store and the inspection bungalow built by the Public Works Department have been completed, but have not yet been handed over. Two new coolie huts are being built on the black soil and a portion of the implement shed is being added to the office, while the rest is being enclosed. During the slack season the farm coolies have been employed in retvetting the drains (odais) on the black soil and as a result many of the fields are becoming level, while further scouring is checked.

The Taliparamba Agricultural Station.

Season.—The hot weather pre-monsoon showers were this year normal and enabled all operations to be done in due season. This included sowing seed beds for wet and dry crops and sowing dry lands. The monsoon broke as usual in the first week of June. There was a break of a fortnight, during which no rain fell in the middle of July. This did much damage to the hill paddy crops in the neighbourhood and may account for the poor yields of groundnut which were low this year on the farm and seem to have been so throughout the district. Monsoon weather of a weaker type continued until the middle of November and as a result there was a serious loss of pepper due both to shedding and to 'Pollu', an injury caused to the green pepper by the larva of a flea beetle, especially in low-lying damp gardens.

2. *Crops.*—Reference was made last year to the success and distribution to ryots of new varieties of sugarcane. On the farm itself there is nothing to add except that several new varieties and sports are being tested. Three or four of these promise even better results than the Mauritius varieties already introduced. Among these may be mentioned a variety from Fiji (No. B), a variety from the West Indies (No. 1529). B.208 introduced last year still fulfils its promise of being admirably adapted to West Coast conditions.

In Malabar crops of introduced cane have done very well, but here the difficulty is that the crop is usually quite new to cultivation, and the methods of crushing cane and manufacturing jaggery are unknown. The staff of the agricultural station are unable to cope with the amount of assistance required, although a new mill and jaggery-making plant have been purchased for the purpose of helping ryots who are newly trying this crop. The Agricultural Associations could, if they liked, do much to help the department here by lending or hiring cane mills and boiling pans to cultivators in their taluk or division. The Palghat association has recently agreed to do so, but it is now too late for this season's crop. In the immediate neighbourhood of the agricultural station where help can be rendered more easily by the department, sugarcane is becoming a recognised crop, and this year several crops, many of them quite as good as those raised on the farm, have been grown by ryots and milled by the department, the ryots paying for the cost of milling.

3. *Pepper.*—As was expected the yield of pepper this year is low, following as it did, a year of very heavy crop. In general, however, the pepper gardens show a steady improvement and this is borne out by the fact that there have been very few deaths among the vines, which usually follow a year of heavy cropping and the crop is little below the average of the last six years. The plot to which lime and leaf-mould is annually applied still continues to show the

* At Sattar.

value of this as a manure for pepper. This is the only plot on the farm which has this year given a better crop than last year, the plantwar yield, excluding young vines, being 675 Madras measures against 629 Madras measures of last year.

4. *Paddy.*—The wet lands continue to give good yields, much above the average of the locality where the methods of wet cultivation are very crude. The average acre yield is this year 887 Madras measures per acre which is slightly less than last season. One important point to be noted is that paddy after sugarcane gives a much better yield than was expected, viz., 570 Madras measures per acre. It would have been thought, with such heavy crops of cane as are raised on the West Coast that the yield of the following paddy crop would have been very much less. The trials of green manuring crops continue to show their value. Cowgram and horsegram grown on the wet land and ploughed in gave an increased yield of 245 and 194 Madras measures, respectively, over a plot which received no manurial application.

On the dry hill land several crops are promising; chief among these are groundnuts, chillies and ginger. The first has not done very well this season, but even then is a paying crop if properly manured. A plot manured with four cart-loads of ashes and four of cattle manure gave a yield worth more than Rs. 85 per acre. This manurial application is not as heavy as would be applied on better soil in the East Coast districts. Chillies gave a dry yield of 1,225 lb. per acre, a very profitable crop considering that it is entirely rainfed and this is likely to be very useful in the district. Ginger gave a yield of 8,376 lb. per acre of green rhizomes which represents a yield of dry ginger of about 1,850 lb. The primary object of these trials is to show how profitable dry land on the West Coast can become when under permanent cultivation. If such a practice were once established in Malabar, it would mean that it would be quite possible to do away with fugitive cultivation and the jungle could then be left to protect the hill sides as well as the valleys below which depend on this jungle for their fertility. Cereals on dry land have this year failed owing mainly to the attacks of wild animals. Such, however, would not be the case if more profitable crops were generally introduced, since the land taken in could be permanently fenced.

5. *Staff.*—Unavoidable transfers of the Officers attached to this agricultural station have not tended towards continuity in management. The Manager was transferred to Coimbatore as Acting Special Assistant to the Principal from 19th May to 19th November. Assistant Manager K. Unnikrishna Menon was away on privilege leave from December 24th 1910 to 16th February 1911. Assistant Manager M. Raman joined the department on 17th June 1910, and was stationed here till 30th September when he had to be temporarily transferred to Kollipatti until 24th December. On again returning here, he had to be relieved and sent to Samalkota on February 6th. These frequent changes made it impossible to pay proper attention to the district work of agricultural improvement.

6. *Miscellaneous.*—The quarters for an Assistant Manager which were commenced last year have been completed during the year under report. The number of visitors continues to increase and it is a promising sign that improvements demonstrated on the agricultural station are being taken up in the immediate vicinity.

TRICHINOPOLY,
8th April 1911.

H. C. SAMPSON,
Deputy Director of Agriculture, Southern Division.

APPENDIX II.

THE ADMINISTRATIVE REPORT OF THE AGRICULTURAL COLLEGE AND RESEARCH INSTITUTE AND THE CENTRAL FARM, COIMBATORE, FOR THE YEAR 1910-1911.

College.—The year under report has marked the completion of the first full course of three years, the first batch of students having been admitted three years ago. It was the first year therefore when three classes have been in residence, and when the College has been working at all under normal conditions. It is to be regretted that the furnishing of the College is still practically the same as it was last year with the exception of the Principal's office room, which has been partially furnished. The Museum, library, lecture room and the rooms connected with the Biological teaching and staff still remain as they were. The Mycologist's room is not yet ready for work. The compound wall has been completed, and after some delay, the drive to the rear entrance of the College made. In other directions progress is less. The water-supply to the College and the whole estate still depends upon two old force pumps worked by hand power which were put in temporarily nearly three years

* *Notes.*—The following are the names of crops mentioned in this report:—

Cumbu = Pennisetum Typhoides; Cholam = Andropogon Sorghum; Sunn hemp = Crotalaria Juncea.

ago: recently some of the permanent pipes and stands have been put in, but the effect has been at once to increase the consumption of water, so that it is found necessary to cut off the water to the bungalows and quarters every now and then, so that the College tanks may be kept supplied. The Government Botanist's bungalow has never had a proper supply and water has to be carted daily. Latterly the same has been the case with the Agricultural Chemist's bungalow. This paucity of water has rendered very difficult the work of tree planting, and in present conditions it is not worthwhile proceeding with this work as the trees cannot be properly attended to after planting. The lighting scheme is still under consideration and the College has as yet no system of illumination worthy of it. During the year, the covered way leading to the latrine in one of the Hostel blocks was blown down and was repaired. The faulty construction of the ventilators fitted to the rooms in the Hostels allowed so much rain to penetrate, in addition to what leaked through the roof itself, that in the wet weather of last July most of the rooms became uninhabitable. The attention of the Public Works Department was at once called to it, and recently some of the ventilators have been closed by means of iron sheets: the rest yet remain to be done.

The fire-extinguishing apparatus indented for at the beginning of the year, has not yet arrived and in any case it is not expected that with the present supply of water it would prove of much use. A scheme for collecting the rain water from the College roof was proposed and drawn up, but has not yet been carried out.

The Indian rest-house mentioned in last year's report has not been sanctioned by Government and will not be constructed.

The question of the disposal of the site occupied by the contractor for brick-making has recently been raised, and it has been decided to keep the land and again bring it under cultivation.

2. *Visitors*.—The Commissioner visited the College in January last, the Director of Agriculture four times and the Deputy Directors of Agriculture, twice, for the purpose of examining the students. The Maharaja of Bobbili visited the College in October last and was shown over the whole building. The Hon'ble Rao Sahib N. Subba Rao Garu, M.R.Ry. Rao Sahib M. Abraham Pandithar Avargal, the Hon'ble Raja of Kollengode, the Poligar of Uthukuli, the Hon'ble N. Krishnaswami Aiyangar and the Zamindar of Kadathur—all Honorary Visitors—and His Highness the Madhava Raja of Cochin with the Diwan Peishkar came during the year and were shown the work of the College and Farm.

3. *Students*.—The number of students at the commencement of the session was 49, sixteen of whom were in their third year and completed their course, twelve in the second year and twenty in their first year. Of the third year, fourteen out of the sixteen qualified for the Diploma and were presented with their sanads by the Director of Agriculture (in the unavoidable absence of the Commissioner) at the close of the year. On the same occasion, the Robertson prize was presented to K. T. Alva, L.Ac., and the Clogston and Koss prizes—the latter for the first time since its institution, to T. B. Ranganath L.Ac.; all the prizes took the form of gold medals.

The senior students went back somewhat in their third year owing to the lack of staff to assist them and supervise their work, but they benefited very much from a fortnight's good coaching which they received from Farm Manager Balakrishna Murthi, who was relieved for the purpose. They made very good use of the two tours which they had, one in Tanjore and South Arcot, and one in the Ceded Districts and Circars: on both occasions they were accompanied by myself and through the assistance of the Deputy Directors were enabled to carry out a most instructive programme. The second year worked well throughout the year. They cultivated their own plots both dry and wet successfully, and took part in all other farm operations. One student resigned during the second term on the ground of ill-health. Of the twenty new students selected at the commencement of the session, four did not join, and their places were filled up, so that the class started full; one student resigned subsequently and the class stands now at nineteen.

Applications for the coming year are less, only 81 having been received. All students this year will be interviewed by myself before nomination.

4. *Terms*.—There was no alteration in the terms which were as follows:—

	Dates.
Summer	7th June 1910 to 25th September 1910.
Michaelmas	6th October 1910 to 16th December 1910.
Easter	9th January 1911 to 31st March 1911.

Recently however, in view of the long spell of work from June 7th to Christmas with only a week's break, it has been decided to have a fortnight's vacation in September which will enable the students to go back and see something of their own crops, of which, since they take their long vacation in the hot weather, many of them remain ignorant during their stay here.

5. *Work—Agriculture*.—Work in Agriculture has continued according to the programme: and not much alteration will be needed in the scheme of work allotted for the first two years. The work arranged for the third year is however not yet considered satisfactory and further changes will be necessary. By postponing some of the lectures now given to the second year, who have already as much as they can manage, the third year will be able better to combine practical and theoretical work, while changes will also be made in their practical work by giving them full control under supervision, over definite areas of the farm lands.

The Chief Assistant M.R.Ry. J. Chelvaranga Raju took the field classes and corrected the note-books of both the first and second years and also later on supervised the note-books of the third year as well. He was on leave until the middle of the second term, during which his work was done by M.R.Ry. Govinda Kidavu, transferred from the Taliparamba Agricultural Station.

Botany—First year.—The Elementary Biology course was restricted to the first two terms, the third term being left for the study of the Biology of Farm animals.

(1) *Elementary Botany*.—The course consisted of 41 lectures and 56 practical classes. A thorough grounding in the main principles of plant life was given, just so much Morphology and Anatomy being taught as would enable the students to grasp the physiological aspects of the subject.

The first year's course was throughout regarded as a preparation of the students for the longer, second year's course in Agricultural Botany.

(2) *Elementary Zoology*.—A month was devoted to a study of the more important groups of invertebrates.

There were nine classes and the course was regarded as a preparation, on the one hand for the course in the Biology of Farm animals in the third term and, on the other, for the course on Entomology during the second year.

Second year.—(1) *Agricultural Botany*.—There were 85 lectures and 72 practical classes. The effect of climate and external conditions on wild and cultivated plants in South India was carefully considered and a short course was given on gardening and Horticultural operations. The more important crops of the Presidency were studied in detail and the general principles enounced of the improvement of crops. Special attention was devoted to seed and plant selection, seed testing and cross breeding.

Mycology.—In Mycology a course of twelve lectures and practical classes was given to the second year students at the end of their Botany course. They were given an elementary idea of the nature of a fungus and the damage it causes to its host plant. The students should be in a position to know where to obtain material in any disease they perceive on their crops and how to submit it for detailed examination: they should also be in a position to apply any remedy suggested. The first six lectures were general and dealt with the life history of one or two typical fungi; the second six dealt with the principal diseases of the more important crops of the Presidency.

Entomology.—This course was reduced in length to a class of three hours once a week throughout the year. There were 33 classes held largely of a practical nature. The students were taught to detect and collect insect pests on the crops in the field while lectures were given as to the main groups of insects, the pests of economic importance and the various methods of combating them.

Chemistry.—The main feature of the year's work has been a rearrangement of the classes in Practical Chemistry based upon the report of the external Examiner. In previous years the practical course was finished in the first year, so that when the students presented themselves for their examination at the end of their second year, they were somewhat out of touch with the work. In order to remedy this defect, during the present year, two classes per week have been given to first year students and one class per week to the second year students.

During the session the first year students received 105 lectures in General Chemistry (Inorganic and Organic) and 69 practical classes of 3 hours duration each. The second year students had 66 lectures in Agricultural Chemistry and 34 practical classes. In all the subjects given, the course of instruction was practically the same as that outlined in the last year's report.

6. *Examinations*.—The Diploma examination falls naturally into two parts: that held at the end of the second year and consisting of Agricultural Botany, Agricultural Chemistry and Entomology, and that held at the termination of the third year in Agriculture, Agricultural Engineering and Veterinary Science. In the second part, held this year for the first time, I was assisted by Mr. Clouston, Deputy Director of Agriculture, Central Provinces, and with him, drew up a scheme allotting the proportions to be given to the different subjects and the total aggregate necessary. The examinations in Agricultural Engineering and Veterinary Science were conducted by the Assistants taking those subjects, as the sanction for the deputation of the Principal of the Veterinary College was not received until too late. It is hoped that outside Examiners will be available for all subjects in future. Mr. Clouston expressed himself satisfied at the work and knowledge of the students.

For the examinations in the first part, the assistance of Mr. Warth, Agricultural Chemist in Burma, was again invoked, while for the Botany, Mr. Southern, Supernumerary Agriculturist, was associated with Dr. Barber. The examination in Entomology was conducted by the Assistant who lectures in that subject.

The results are exceedingly satisfactory as all the second year students have passed in all the subjects. Of the third year students who had to reappear for the subjects in which they failed last year all but one have passed. The success of the second year is no doubt partly due to the process of elimination which has already reduced their numbers and all those who will now proceed to their third year are good students who should do the College credit.

7. *Students' Club.*—The Students' Club continues to flourish, in all but its finances, though these are, it is hoped, now on a satisfactory basis. The Club can count on a revenue, apart from the donations of visitors, of about Rs. 100 a term and this has to provide for all the expenditure on games including wages of staff, upkeep of cricket and tennis grounds, as well as purchase of newspapers for the Reading room, and the expenses of Debates, Meetings and Social gatherings. The Club has been handicapped till now by heavy initial expenditure incurred in the purchase of materials and the construction of a new tennis court and is even now slightly in debt, but next term should see it thoroughly solvent. A fair number of matches have been played in hockey and cricket but up to the present only one has been won.

The post of Warden continued to be Honorary throughout the year and was occupied by the Assistant to the Agricultural Chemist, M.R.Ry. Ramaswami Sivan. His work has been very arduous and responsible during the whole period, as his duties have largely increased since the foundation of a mess to which many of the students belong. The original proposal, that students should make their own arrangements, has been found unsuitable for various reasons chiefly the distance from the town and the long hours of the students, and a voluntary mess was started at the commencement of the year which has proved most successful mainly owing to the untiring care displayed by the Warden. Further changes, with a view to putting this mess on a more permanent and quasi-official footing, are now under consideration.

The co-operative society still supplies a great want and fortunately there is a chance that it may become a permanent institution. Proposals are now being considered whereby the stores are to erect their own building on land leased them at a nominal rent by the department. Certain alterations in their rules by which people wishing to purchase from the stores may become associates are also being considered.

8. *The Farm.*—The season has been favourable for wet crops and bumper yields of paddy have been obtained, averaging for the whole area of nearly 40 acres, experimental and non-experimental exactly 3,000 lb. per acre, an increase of about 500 lb. per acre over last year's crop. Though this is partly due to the season, there is no doubt that the care in seed selection and improved methods of cultivation are partially responsible. The various experiments which will be found more fully dealt with in the Scientific Report, have confirmed the value of green manuring, and are indicating great possibilities of the profitable utilisation of artificial manures in combination with green leaf. The sugarcane crop has done very much better than last year and has attracted much attention. The demand for seed canes of the introduced varieties has been fairly brisk and were the staff available for itinerant work, they could certainly effect much improvement.

For the dry crops the season was not so favourable and the break in the monsoon during September and October threatened to become extremely serious, though fortunately rains saved the crop from complete failure. The drilled cotton again has failed to compare very favourably with the broadcasted, but this is partly due to the inexperience of the farm coolies, who are slow in acquiring the necessary skill. The later drilled crops show an improvement over those put in first and confidence in the ultimate success of the drill is unshaken. Experiments with garden crops were again devoted to the more economic utilisation of the water lifted from wells and the ridge and furrow system with ragi proved quite successful. With other crops, various points as to the seed rate, the distance between the rows and the method of sowing have yet to be worked out.

Two machines have been supplied to the farm for official tests: a double diaphragm pump made by the Basel Mission, which has not yet been tested owing to a break in the bullock gear through which it is driven, and the other a sugar-cane mill by Messrs. Burn & Co., who have lately established a depot in Madras. This is awaiting trial when the cane crop is out. There has also been some correspondence with the Director of Industries and other gentlemen on the subject of evolving a winnowing machine suitable in price and efficiency to South Indian conditions.

The number of livestock has increased during the year by twenty eight: sixteen births and nineteen purchases while four were sold and three died. Outside relations continue to improve, and an increased number of animals were brought for service and treatment. An outbreak of foot and mouth disease in March last was inconvenient but resulted in only one death while recently rinderpest has been responsible for two deaths. The whole herd were inoculated without delay.

The Dairy is still awaiting completion by the Public Works Department. Efforts have been devoted during the past year to getting together some good cows but they are extremely difficult to obtain as none but the best are needed. The young stock at present number 41 and there has been one casualty among them during the year. It is a matter of the very greatest regret that Bagyam, the mother of the dairy herd, died on the 9th March from rinderpest. She had a splendid record and will be impossible to replace. One other death occurred, but the whole herd of working cattle, cows and calves was inoculated and though two animals are still on the sick list, no further casualties are expected. The care of the livestock generally is in the capable hands of the Veterinary Assistant, who maintains the registers. No arrangements have yet been made for the management of the dairy.

A cross bred Merino ram purchased from the Jail last year has been running with a flock of picked Coimbatore ewes belonging to a shepherd who lives on the estate and there are at present twenty-seven lambs dropped to him, on the estate. The shepherd expresses himself completely satisfied with the ram and there seems to be a demand for the cross bred ram lambs for breeding purposes.

Good progress has been made in laying out the estate, and the Engineering Assistant has supervised the construction of a shed for inflammable materials, such as spirit and ether which it was not safe to store in the College, a Meteorological shed in the College compound where all the Meteorological apparatus is now transferred, a masonry incinerator for disposing of the rubbish collected on the estate, and various minor works such as road making, levelling and repairs to wells. He has also prepared a large scale map of the estate which will be kept up to and of which reproductions can from time to time be made.

The old quarters, mud structures, erected when the farm land was first acquired, were razed and the sites tidied, while an Officers' Club was built on land rented to them.

The sheds erected for the sanitary staff were unfortunately washed away in the heavy rains of October and fresh temporary quarters have been found for them pending the resumption of the land now occupied by the contractor.

The appearance of the estate has however benefited more than anything from the generous prizes offered by the Director of Agriculture, for the best garden, which produced in almost every quarter, what were, in some cases, extremely good and well kept gardens.

9. *Staff.*—The farm staff is still barely able to cope with the work. The three Assistant Farm Managers manage the three blocks, one of wet land and two of dry, north and south and measuring about 42 acres, 197 acres and 109 acres, respectively. Much of this area is double cropped and they have not only to forecast, supervise and account for the labour required, but in addition carry out the large amount of experimental work and maintain the cultivation sheets necessary according to the rules. The Farm Manager is fully occupied with the general management of the farm, while the Office Manager, with the help of the clerk keeps all the accounts, and disburses the whole of the expenditure. Further increase in the staff will be necessary to cope with the work of the dairy, which it is hoped to run as a separate institution, while when the water-supply is handed over, the Mechanic will need assistance in looking after it. All the Assistant Farm Managers have been changed during the year, one going to Samalkota, one to Nandyal and one to Hagari. Assistant Farm Manager S. Subbaiya who was posted for duty here after undergoing a course of poultry training at Pusa, had to be put on to farm work immediately on his arrival, and until he can be relieved, little can be done to make proposals with regard to the poultry section either experimental or educational. The work of Farm Manager has been most efficiently carried out by Balakrishna Murti who was promoted to first grade Manager's post on the 1st July last. Recently M.R.Ry. Ananda Rao, Probationary Assistant Director of Agriculture in the Northern Division, has been posted here to take charge of the farm, which set free Balakrishna Murti to coach the third year students before he took leave on the 11th March. My office staff have also had to cope with a greatly increased amount of routine work, and proposals will shortly be submitted for an extra hand.

Owing to certain changes in apportioning the cost of labour the amounts spent under the varying heads are not strictly comparable with those of last year. The total expenditure has been about the same. The actual expenditure on the farm has decreased by about Rs. 4,000, but there has been some decrease under capital charges.

The charge under maintenance of cattle has increased owing to the increase in the herd, while the expenditure on coolie labour has decreased. The receipts are less by about Rs. 9,000, but this is accounted for by the lateness of the season, no cotton for instance having yet been picked. There is about Rs. 2,000 worth of produce in the store.

COIMBATORE,
9th April 1911.

R. CECIL WOOD,
Principal.

APPENDIX III.

ANNUAL REPORT OF THE GOVERNMENT BOTANIST, 1910-1911.

I have the honour to forward the following report of the work done in my section during the year 1910-1911.

2. *General*.—The work of the various officers continued without interruption. Most of the apparatus in the Entomological and Botanical sections was received by the end of the year but hardly any of the furniture sanctioned by Government was put in. This was found specially inconvenient in the lecture room, the teaching laboratory and the herbarium, these rooms being still largely unfurnished. No iron racks or cup boards were put in the store room where it has become very difficult to keep the things in order and the floor is strewn with delicate apparatus.

3. *Changes in staff, leave, etc.*—The staff remained the same throughout the year with the exception of the dismissal of two plant collectors for overstaying their leave, several changes in the second clerk's post and an acting appointment as Assistant in Systematic Botany. The latter officer returned to duty after many months' sick leave on October 6th and for six months a temporary substitute worked in his place. Several of the other assistants had short periods of privilege leave. The Government Botanist was on leave during April when Mr. K. Hanganahar took charge of the office.

4. *Government Botanist*.—The bulk of the Government Botanist's time was devoted, as during last year, to teaching, and research work was largely relegated to the Economic Assistant. During two periods, together aggregating about one month, he was in charge of the Principal's duties while that officer was on tour with the students. Thirty-five days were spent in touring, Samalkota, Anakapalli, Nellikuppam and the western taluks of Bellary being the chief places visited. Besides many reports of minor importance, the introduction of Cambodia cotton into the western taluks of Bellary received special attention. The routine work of the office was heavy during the year.

Two courses of instruction were given which have been referred to elsewhere. In Elementary Botany 41 lectures were delivered and 56 practical classes held while in Agricultural Botany there were 85 lectures and 70 practical classes.

5. *Systematic Botany*.—The collecting of plants for the herbarium has practically ceased, only two short tours by fieldmen having been made to the neighbouring low hills. Some attention was paid to the various species of *Loranthaceae* by the Government Botanist while on leave and a considerable collection of these important parasites put together. Some 1,250 plants were worked out in the herbarium and about 200 plants named for various officers and private individuals. Four thousand five hundred sheets were written on and incorporated in the herbarium. A set of 832 named sheets was sent to the Calcutta herbarium and 285 received in return. As already noted the work in this section was rendered more laborious and difficult because of the failure of Public Works Department contractor to make the herbarium cases and working desks.

6. *Economic Botany*.—This constituted the main work of the office in the intervals of teaching. The seed-testing apparatus was got into order and a register maintained. Some 144 samples of seed, chiefly local, were tested as to their germinating power. The farm seed proved on the whole to be very good.

Owing to the receipt of several specimens of seeds for determination, and for assistance in teaching, a seed collection was started. The work proved very laborious, but some 520 numbers have been collected, mostly with herbarium specimens for reference. When this collection is in any way complete it will be possible to test most seed samples for purity as well as germinating capacity, but this has not hitherto been attempted for India.

A number of local drugs were received from the Medical Stores Department, submitted to Botanical examination and determined.

A collection of some 80 samples of agricultural products was put together and forwarded to the Inspector-General of Agriculture.

The collection of crops and their products for the general museum collection was pushed on as fast as the present staff permitted. Four long tours were made by fieldmen and large numbers of specimens were obtained. These will form the basis of an agricultural survey of the Presidency and will serve as a store-house for the museum, while the specimens collected are of constant use in teaching.

Special attention has been devoted throughout the year to the root systems of plants. Selected specimens of all the crops growing on the farm have been dug out and the roots carefully dissected, analysed and photographed. Some interesting results have been obtained regarding the soil and water requirements of different crops.

The study of gogu, *Hibiscus cannabinus*, was continued and brought to a definite stage. The mendelian factors noted were the lobing of the leaves, the colour of the shoot and the markings on the seeds. Six separate varieties have now been made out and grown pure for a

couple of generations. Trials were made as to their production of fibre but these are inconclusive. The next stage will be the growing of them in bulk to determine if they differ in productiveness and the value of their fibre.

In mirabilis the colour factors were further studied. Numerous observations were made with the Tintometer and the working of mendelian laws observed. These plants have proved of the greatest use in training the economic assistant engaged in the cross-breeding work.

The chief work of M.R.Ry. T. S. Venkataraman has, however, been in connection with cotton, and I wish to express my appreciation of his diligence and zeal. Crosses were made and studied between Cambodia and Bourbon, Bombay and Bourbon, Broach and Uppam, Hinganghat and Karunganni, Spence and Bourbon. The aim in this work has been to study the characters of the varieties and to determine the mendelian factors. Thus far it seems certain that the habit of the plant and the shape and size of the bolls are such factors, both of them important from the crop point of view, and it is hoped that, in two plants at least, useful characters have been brought together. Many minor characters have also been studied in the hope of noting correlation with productiveness but nothing very definite has been arrived at.

The cotton seed analysis experiments commenced by the Government Botanist have had to be largely discontinued. Enough observations were, however, possible to make it fairly certain that by careful selection, before sowing, a considerable number of worthless varieties could be eliminated. The teasing of 'kappas' and mounting on sheets was continued as time permitted, and a large collection has been got together by which the relations between size of seed, fuzz and lint can be demonstrated.

Work with cumbus (*Pennisetum typhoideum*) has failed owing to the non-germination of the seeds of the crossed plants. A number of crops have been examined and separated into groups for further study on the farm, especially red gram, horsegram and castor. In the latter a second generation was grown for the purpose of eliminating the hybrid character usual in the field crops and when this has been accomplished all the varieties are to be tested as to their suitability as food for eriworms. The work on root parasites is at present in abeyance, but a number of attempts have been made to establish *Ximenesia americana* in the Botanic garden.

7. *The Botanic Garden*.—The garden has been of considerable use in growing crops for mendelian work, in teaching the students the elements of horticulture and in beautifying the college surroundings. About 400 trees have been planted out and some 10,000 plants distributed, largely to the gardens of the students and staff. The system of lateral protection from the prevailing winds has been largely extended and masses of trees and shrubs have been so placed as to guard the main portions of the garden. A small laboratory has been built, a house for the Overseer and one for eri silk culture. An arch has been erected over the entrance. Considerable difficulty has as usual been found with regard to water-supply and one of the farm wells has been placed at the disposal of the garden by the Principal. But even with this it has not been possible to irrigate the upper, drier portions. Owing to the dismissal of the Overseer a fieldman has been put in charge.

8. *Entomology*.—The work in this section was continued on the usual lines, all reports being sent to the Imperial Entomologist for remarks. The latter officer visited the College in May, examined the collections, went through the records and drew up a programme of work for the year. The section is greatly indebted to Mr. Lefroy for his assistance. The First Assistant remained in charge of the collections, attended to the teaching and the farm pests. During vacations he visited Ganjam, North Vizagapatam, Malabar, South Canara and Kollegal. In the latter taluk he studied the local silk worm methods and brought mulberry cuttings for growing in the Botanic garden. The Second and Third Assistants toured through the northern and southern portions of the Presidency respectively. Collections were made in Malabar, Bellary, Guntur, Kistna, Kurnool, South Arcot, North Arcot, South Canara, Tinnevely, Madura, Ramnad and Trichinopoly districts.

The more important outbreaks of the year were swarming caterpillars on paddy, hairy caterpillars on cereals in South Arcot, the Deccan grasshopper in Bellary, rice bug in South Canara, and these were more or less effectively dealt with. The Bellary grasshopper work carried out by the Second Assistant M.R.Ry. Y. Ramachandra Rao, gives promise of a successful issue and I would draw attention to the good work done by this Officer. He has invented a trap which will be given a further trial during the year.

Sericulture in one form or another has taken up a good deal of time and four experimental broods of eri worms have been raised in the college by the First Assistant. A study of the mulberry silkworm has been commenced and efforts will be made to extend this branch in such places as are suited to it. For the eri work a trained man has been lent by Pusa and a special house has been built in the Botanic Garden.

Leaflets were prepared on the following subjects:—

The swarming caterpillars on paddy in Malabar, hairy caterpillars in South Arcot, the light trap, the rice bug in South Canara, Caneborers, Coconut beetles, The Tobacco caterpillar, The Rice Hispa. A note on the life history of coptosoma was prepared by the First Assistant and forwarded to the Bombay Natural History Society for publication.

9. The artist was fully employed during the year and did good work. He prepared 32 diagrams for class work, painted a series of marabils flowers and made about 20 line drawings for the Director and other officers of the department. An entomological collector sent down by Mr. Vernon, I.C.S., was trained in insect painting.

COIMBATORE,
11th April 1911.

C. A. BARREZ,
Government Botanist.

APPENDIX IV.

ANNUAL REPORT OF THE MADRAS AGRICULTURAL CHEMIST FOR THE YEAR 1910-1911.

I have the honour to submit herewith my annual report for the year ending March 31st, 1911.

2. There are no changes to report in the constitution of the staff, but an application has been made for an increase in the number of assistants so as to allow of special investigations being undertaken in particular districts to allow of adequate chemical control in dairy work and to permit of more research work being accomplished.

During the year, the following samples have been examined:—

Alkaline soils	1
Soils	143
Sugarcane and sugar-containing plants	68
Sugarcane products	5
Oil-seeds	17
Poonacs	3
Green manures	4
Fish manure	5
Village and farm-yard manure	18
Artificial manures	8
Miscellaneous manures	18
Food-stuffs	8
Waters	14
Silts and silty waters	1
Miscellaneous samples	12
Total	325

This is a decrease of 70 as compared with the number of samples analysed last year, but the decrease is mainly in the number of oil-seeds, sugarcane and alkaline soils, all of which require comparatively little time for examination. On the other hand, the number of soil samples examined has increased from 56 to 143 and as such examinations are usually long and complicated, the time of the two assistants deputed to this work has been fully occupied. In fact it has been found impossible to deal with samples as soon as received and about 70 samples received during the later part of the year are still to be analysed.

In previous reports reference has been made to the fact that persons outside the department were forwarding samples for analysis and report and this year has shown a decided increase in the number of such samples. During the year 1909-1910, the number of external samples received was 59 of which only 15 were soil samples and this year the numbers have increased to 106 and 78 respectively. In addition the number of communications from cultivators asking for advice has greatly increased.

3. With regard to investigations the work connected with the gases evolved from paddy land has been continued and the results of the previous year's work confirmed and at the same time a new field of enquiry has been opened with regard to the nutrition of paddy cultivated under swamp conditions.

4. A large amount of preliminary work has been done on the composition of the black-cotton soils of this Presidency, particular attention being paid to their relation with the underlying geological formation. This work will probably enable these soils to be classified and at the same time throw some light upon their formation.

5. The work in connection with the introduction of manures into the Kistna has been continued and success has been attained in interesting many ryots in the subject such that a firm of manure manufacturers has decided to open depots in the district for the sale of manures. It is probable, that for a year or so, progress will be slow, but the experiments

and demonstration plots have on the whole yielded such encouraging results that ultimate success appears almost certain. So far as the delta as a whole is concerned, it is now possible to indicate in a general way the most effective means of manuring the paddy but incidentally the experiments have shown that the soil of the delta is by no means uniform and that certain areas will require a different manurial treatment to that needed by the greater part of the delta. These experimental results are in agreement with the analytical results obtained from a rough soil survey of the district.

6. The following minor investigations were also carried out:—(1) The manurial value of certain water weeds of the Kolair lake, (2) the value of sweet sorghums from the point of view of jaggery-making, (3) a comparison of the South Canara tobacco with the better sorts of South Indian tobaccos, and (4) the distribution of nitrogen in green-manure plants.

During the year the Agricultural Chemist was on tour for 58 days and members of his staff for 58 days.

COIMBATORE,
7th April 1911.

W. H. HARRISON,
Agricultural Chemist.

APPENDIX V.

ANNUAL REPORT OF THE MADRAS MYCOLOGIST.

I have the honour to submit my annual report for the year ending 31st March 1911.

2. Staff.—M.R.Ry. S. Sundararaman Avargal, M.A., Assistant in Mycology returned on 14th April 1910 from a period of sixteen months training at Pusa. He worked throughout the year with the exception of twenty days' privilege leave. He was on tour for 108 days.

3. The laboratory in the Agricultural College is now being fitted and the equipment has begun to arrive during the last month.

4. With apparatus kindly lent by the Imperial Mycologist, Pusa, I have been able to do a certain amount of preliminary investigation of several diseases of crops. But realising that no research work could be undertaken till the laboratory is ready, I have spent a good deal of time touring in order to get to know the crops of the Presidency and their most common diseases. I was on tour 172 days.

Much time was taken up with the palmyra disease operations in Gôdâvari and Kistna deltas. The area infected by bud-rot has been defined. The work of cutting and burning the crowns of leaves of diseased palmyras is now being carried out over the whole area and with the increased supervising staff the work is being carried out more thoroughly. In the monsoon a series of successful inoculations were made with the fungus causing the disease and the investigation of the methods by which the disease is spread is progressing. In the Nilgiri district the potato crop was examined and the chief diseases found were ring disease and scab of the tubers and "early blight" of the leaves and stems. Several blights of fruit trees were noted there: they will be taken up in the near future.

The three smuts of cholam, long smut, short smut and whole-head smut, caused by *Tolyposporum fitiferum* Busse, *Contractia sorghiculgaris* (Tul.) clin. and *Ustilago Reikiana* Khun, respectively are under investigation and a simple and cheap method of treating the seed before sowing is being worked out. Smut on paddy is also under investigation.

6. A beginning has been made of cataloguing the fungi on economic plants of the Presidency.

One hundred and nine mounted sheets of diseased plants were received from the Imperial Mycologist's collection at Pusa. Hundred sheets have been added during the year. These form the beginning of a herbarium of the parasitic fungi of Madras and will be a useful adjunct in both investigation and teaching.

A short course on plant diseases was given to the second year students at the end of their Botany course.

COIMBATORE,
12th April 1911.

W. McBAE,
Madras Mycologist.

GOVERNMENT OF MADRAS.

REVENUE DEPARTMENT.

Read—the following paper :—

**Proceedings of the Board of Revenue (R.S., Sur., L.R. and Agri.),
No. 280, dated 31st July 1911.**

The Hon'ble Mr. A. BUTTERWORTH.

Read—the following paper :—

Letter—from M. E. COUCHMAN, Esq., I.C.S., Director of Agriculture, Madras.
To—the Secretary to the Commissioner of Revenue Settlement, Survey, Land
Records and Agriculture.
Dated—the 11th July 1911.
No.—Dis. 1452.

Resolution—No. 280, dated 31st July 1911.

The Board begs to submit to Government the report of the Director of Agriculture on the operations of the Department of Agriculture for the year 1910–1911. The report is as usual interesting and informing.

2. *Staff*.—The second post of Assistant Director was filled up by the appointment on probation of M.R.Ry. K. Ramasastrulu Nayudu Garu, a graduate of the University of California. Mr. Sampson having applied for six months' leave from 23rd April 1911, Mr. H. Southern, a Probationary Agriculturist at Pusa, was deputed to this Presidency to take the place of Mr. Sampson. Mr. Southern's services were, however, secured with effect from February in order that he might familiarise himself with the work of the division before Mr. Sampson went on leave. It was stated in the last year's review that the addition of an Entomologist to the cadre of the Madras Agricultural Department was required to bring the equipment to the standard originally contemplated. Application was made during the year for the appointment of a European Entomologist and orders have just been received sanctioning the appointment temporarily for a period of five years in the first instance.

3. *Agricultural stations*.—No new Agricultural station was opened during the year under report. In the last year's report, doubt was expressed by the Director as to the successful maintenance of the Agave plantation at Hindupur. Government have since sanctioned the abandonment of the plantation. During the year, the Director of Agriculture also proposed the abandonment of the Bezwada farm owing to its unsuitability for experimental work. The farm came into the hands of the Agricultural Department from the District Board, Kistna, in 1908 and its maintenance by the Agricultural Department was ordered as a tentative measure. The orders of Government on the proposal to abandon it have not yet been received. The season was favourable at Bellary and at the Central farm. At other stations, it was more or less unfavourable.

Sugarcane.—The Red Mauritius is making rapid progress in South Arcot, no less than 96 per cent. of the area under cane in this district being planted with this variety. The Director considers that South Arcot will in time become the leading centre of the sugar industry in Southern India. In Malabar, sugarcane is a new

crop, but it is reported to have made a good start and to be likely to extend rapidly. Experiments at various farms indicate the importance of drainage in the cultivation of this crop.

Ground-nut.—The progress made with this crop in South Canara was unsatisfactory perhaps in consequence of the ignorance of the people in regard to dry cultivation. Experiments conducted at Taliparamba show that ground-nut forms a useful rotation crop on the West Coast and the Director surmises that the growing pressure of population may stimulate the cultivation of this crop.

Cotton.—Valuable work is being done in Tinnevely and Kurnool in encouraging the growth of superior varieties of cotton and there is every reason to suppose that a permanent improvement in the cotton crop will be secured by the exertions of the department. Karunganni is rapidly becoming the staple cotton crop in Tinnevely and the cultivation of the remunerative Cambodia cotton has now extended to six districts. In no direction has the department done better work than in regard to cotton.

Paddy.—Special efforts have been made to demonstrate to the ryots of Tanjore the wastefulness of the present methods of planting and there is good reason to hope that a substantial economy of seed will be the consequence. The Director calculates that a saving of Rs. 3 per acre in seed can be effected by the single planting method. In various parts of the Presidency, the ryots are beginning to reduce their seed rate in consequence of the ascertained results of economy in seed.

Green-manuring.—The highly important experiments on the production of good green-manure crops continue. The ryots are beginning to take the matter up and there is every reason to hope that in course of time the growth of green manure will be a regular process in the cultivation of paddy.

Sericulture.—A few broods of Eri silk worms were reared at the Coimbatore Farm and experiments are now in progress to determine whether the industry is likely to turn out profitable. Attention is also being paid to the prospects of extending the Mulberry silk worm industry.

4. *Tobacco.*—The lankas leased to Mr. Barry for the introduction of an improved variety of tobacco were inspected by the Deputy Director of Agriculture, Northern Division. It appears that the season was disastrous, the early seed-beds having been repeatedly destroyed by heavy rain. In spite of this and of the partial failure of the monsoon, good crops were obtained on portions of the land.

5. *Agricultural instructions at the College of Agriculture.*—The Agricultural College has now completed three years of its existence. The first batch of students admitted in 1908 finished their course at the end of the year under report. Their number was sixteen and fourteen obtained the diploma at the final examination. The results of the examination of second-year students in Botany, Agricultural Chemistry and Entomology were even more satisfactory, in that every one of them was successful. These results were recently reported to Government who have been pleased to note the very satisfactory character of the results produced. In order to secure that the maximum strength of 20 students is kept up in the first-year class, the Principal has been instructed to keep a reserve of candidates, from among whom vacancies can at once be filled up.

6. *Non-official visitors to the College.*—The Director's report states that six visits were paid by non-official visitors. The terms of all these visitors have expired except in the case of one. The Board has made proposals for the appointment of a new body of visitors.

7. *Agricultural Associations and Exhibitions.*—Exhibitions and Cattle shows were held at Madura, Tirupur, Berhampur, Pithapuram, Ellore, Kottavalasa, Ongole and Kottacheruvu. The Director's views as regards Agricultural Associations were brought to the notice of Government in Board's reference No. 1191, dated 8th May 1911. The Board has expressed its concurrence in the opinion of the Director as to the general inutility of these Associations.

8. The discontinuance by the Government Botanist of certain branches of economic work has attracted the attention of the Board and the question of making some alterations in his duties is under consideration.

9. *Meteorology.*—The rainfall registered at the various rain-gauge stations was tabulated as usual and the results published by the Meteorologist, Madras, and Deputy Director of the Madras Observatory. The total number of stations in the Presidency at the end of the official year 1910-1911 was 472 inclusive of 84 in the Native States against 476 (revised figure) at the end of the previous year and, of these, 365 stations were inspected.

10. *Statistics.*—The following returns were published in connection with local enquiries under provincial direction:—(1) Monthly season reports in three sections, rainfall, cultivation and prices of food-grains and salt; (2) annual crop forecast reports in respect of cotton, paddy, ground-nut, indigo, sugarcane, castors and gingelly and (3) two quarterly and one half-yearly reports of cattle mortality.

(True Extract.)

S. VENKATARAMADAS,
Secretary.

To the Secretary to Government (Revenue Department),
Director of Agriculture.

Order—No. 2707, Revenue, dated 6th September 1911.

Miscellaneous.

Recorded.

2. The report embodies the results of the fifth year's working of the Agricultural Department since its reorganization in 1905-1906, and the Government have no hesitation in endorsing the remarks of the Board of Revenue as to the valuable work which the department has done during that period. In many directions, and notably in the introduction of improved cotton staples, in the establishment of disease-resisting species of sugarcane, in the demonstration of the single-planting method of paddy cultivation and in the operations to check and eradicate the palmyra tree disease, the reorganized Agricultural Department has already achieved results which more than fulfil the hopes with which the reorganization was undertaken. During most of this period the department has been under the direction of Mr. M. E. Couchman, I.C.S., who has just severed his connection with it, and the Government have pleasure in recognizing the considerable share which Mr. Couchman's intelligent and sympathetic administration has had in eliciting the valuable results produced by the experts under his control.

3. In the Agricultural College at Coimbatore the year 1910-11 was marked by the passing out of the first batch of trained agricultural students. Many of these men are reported to belong to the landholding classes and to be going back to the management of their own lands. The Government trust that the knowledge which they have acquired will be turned to the advantage of themselves and their neighbours. The results of the college examinations conducted as these are by independent examiners unconnected with the institution bear testimony to the good work which has been done by the teaching staff.

4. Economic research was carried on throughout the year by the Government Botanist, the Agricultural Chemist, the Mycologist and their assistants. The Government note with special interest the efforts of the Agricultural Chemist to determine the manures suitable to the various soils of the Kistna delta. They hope that he will be able to place his results before the cultivator in such a form that they will be able to appreciate their value.

5. The chief aims of the work of the agricultural stations continue to be the spread of superior varieties of cotton and canes and the advertising of the advantages of single planting of paddy and of the use of green manure crops. The Government recognize the solid benefits which have already been conferred by the department on the cultivators of cotton and cane and note with interest the prospect of a large development of the sugarcane cultivation in South Arcot and on the West Coast. They are pleased to observe the energetic efforts made during the year to propagate the method of single planting of paddy. They trust that similar efforts will be made to introduce green manure crops in those tracts where the manure difficulty is acute.

(True Extract.)

A. G. CARDEW,
Secretary to Government.

To the Board of Revenue (Revenue Settlement)
 „ Hon'ble Mr. Chatterton (Superintendent of Industrial Education).
 „ Educational Department.
 „ Local and Municipal Department.
 „ Public Department.
 „ Public Works Department.
 „ Inspector-General of Agriculture.
 „ Minister of Agriculture, Argentine Republic.
 „ Entomologist to the Government of India.
 „ Mycologist „
 Copy to the Government of India (Revenue and Agricultural
 Department) with C.L.
 Editors' Table.

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