

Report
on The
Operations of The Department of
Agriculture,
Madras Presidency
for The official year
1911-1912



REPORT

ON THE

OF THE DEPARTMENT OF
AGRICULTURE,

MADRAS PRESIDENCY

FOR THE OFFICIAL YEAR

1911-1912.

MADRAS:

PRINTED BY THE SUPERINTENDENT, GOVERNMENT PRESS

1912.

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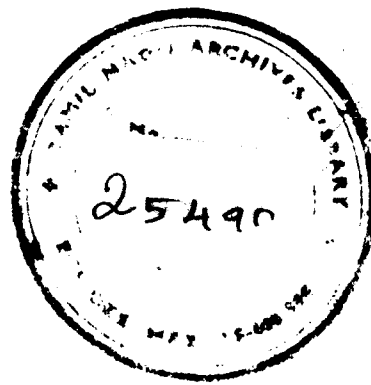
Maximum number of pages prescribed—

Agricultural Report ..	10
Report on the College of Agriculture, Coimbatore ..	..
Administrative report of the Agricultural stations ..	..
The Madras Agricultural Chemist's report ..	..
The Government Botanist's report ..	4
The Madras Mycological report ..	..
The Report of the Honorary Director of Fisheries ..	..

CONTENTS.

J. 2117 N11

N12



AGRICULTURAL REPORT—

	PAGE.
Section I. Administration ..	1—2
" II. Agricultural Education ..	2—3
" III. Research and Experiments ..	3—8
" IV. Demonstration, Aid to the public, Shows, Agricultural Associations and General progress ..	8—12
" V. Agricultural Engineering ..	12
" VI. Publications and Supply of information ..	12—13
" VII. Miscellaneous ..	13

APPENDIX I—

The Administration report of the Agricultural College and Research Institute and the Central Farm ..	14—17
--	-------

APPENDIX II—

The Administration report of the Agricultural Stations ..	18—27
---	-------

APPENDIX III—

Annual report of the Madras Agricultural Chemist ..	27—28
---	-------

APPENDIX IV—

Annual report of the Government Botanist ..	28—31
---	-------

APPENDIX V—

Annual report of the Madras Mycologist ..	32
---	----

APPENDIX VI—

Report of the Honorary Director of Fisheries, Chepauk ..	33—34
--	-------

3

REPORT
ON THE
OPERATIONS OF THE DEPARTMENT OF AGRICULTURE
FOR
1911-1912.*

I.—ADMINISTRATION.

(a) STAFF.

Mr. M. E. Couchman, I.C.S., was in charge of the office of the Director of Agriculture until 9th August 1911 when he proceeded to England on a year's furlough on medical certificate. I have been acting as the Director of Agriculture from that date. Mr. Couchman spent 48 days on tour in the first four months of the year and I have toured for 101 days during the remaining eight months. Mr. Couchman visited the Coimbatore Agricultural College twice and I visited it on four occasions. I have inspected all the agricultural stations and also attended the meeting of the Board of Agriculture at Pusa in November. Messrs. Barber and Sampson accompanied me to Pusa.

2. Mr. Wood availed himself of five weeks' privilege leave in April and May 1911 and Mr. Harrison, the Agricultural Chemist, was placed in charge of the current duties of his office. Mr. Sampson availed himself of six months' privilege leave and special leave from 22nd April. On his return to duty in October he was placed on special duty for conducting a Cattle Survey of the Madras Presidency—*vide* G.O. No. 2607, Revenue, dated 25th August 1911. The period of special duty was originally fixed at three months but was subsequently extended to eight months—*vide* G.O. No. 1430, Revenue, dated 13th May 1912. Mr. H. Southern, Probationary Agriculturist, was in charge of Mr. Sampson's office from 22nd April up to the end of the year. Assistant Director M.R.Ry. D. Ananda Rao Garu completed his year's training in Farm Management at Coimbatore and was confirmed in his appointment from 18th January 1912. His head-quarters have been fixed at Rajahmundry. Assistant Director M.R.Ry. K. Ramasastrulu Nayudu Garu continued to work under the Deputy Director of Agriculture, Southern Division, Trichinopoly. He is still on probation pending his passing an examination in a vernacular language.

3. The appointment of an European Entomologist, for a term of five years in the first instance, was sanctioned by His Majesty's Secretary of State for India in a Despatch communicated in G.O. No. 2080, Revenue, dated 10th July 1911. Mr. T. Bainbrigge Fletcher, F.E.S., F.Z.S., Supernumerary Entomologist in the Imperial Department of Agriculture, was appointed to this post and joined duty after the close of the year under report, on 24th April 1912. Mr. McKae was confirmed in his appointment as Madras Mycologist in G.O. Mis. No. 989, Revenue, dated 1st April 1912. Application was made towards the close of the year for the appointment of an Assistant Principal and an Assistant Economic Botanist.

4. The minimum pay of Assistant Farm Managers was raised from Rs. 25 to 35 in G.O. No. 2698, Revenue, dated 5th September 1911. The seven permanent vacancies that were reported in this grade in 1909-1910 have now been reduced to three. Two of these three have since been filled. Application has recently been made for the creation of seven more posts of 2nd grade Farm Managers and there is now a fair prospect of filling them if they are sanctioned. The work of the department has been greatly hampered in the past by want of staff and it is hoped that it will be possible to expand in every direction in the future.

* *Note.*—The form of the report has been changed this year in accordance with the wishes of the Government of India—*vide* Madras G.O. No. 3168, Revenue, dated 26th October 1911.

(b) BUILDINGS AND LAYING OUT OF FARMS.

5. Of the various buildings and other works mentioned in paragraph 13 of last year's report most remained uncompleted at the close of the year under report. The pot culture house was completed in the year and the dairy and the ornamental book cases for the library have since been completed. The Mycologist's bungalow and laboratory, the furniture and alterations in other parts of the college, and the water-supply still remain incomplete. The remaining portion of the water-supply scheme and the installation of vacuum and pressure pumps at a cost of Rs. 10,050 was sanctioned in G.O. No. 786 W., dated 28th June 1911, and the construction of a veterinary hospital was sanctioned in G.O. No. 552 W., dated 25th April 1911. Neither of these works have been completed. The construction of additional quarters for the staff at a cost of Rs. 25,250 was sanctioned in G.O. No. 706 W., dated 17th May 1912, and of a hostel dining hall for the students at a cost of Rs. 2,330 was sanctioned in G.O. No. 459 W., dated 26th March 1912. The construction of quarters for the Entomologist at a cost of Rs. 18,000 has been sanctioned in G.O. No. 325 W., dated 29th February 1912. The 9.56 acres of lands referred to in last year's report have not yet been acquired and handed over by the Revenue Department. The continued delays in completion of works in charge of the Department of Public Works were brought to the notice of Government in November last and a considerable improvement in the rate of progress has since been noticeable.

6. The building of an official bungalow for the Deputy Director of Agriculture, Southern Division, Trichinopoly, at a cost of Rs. 17,570 was sanctioned in G.O. No. 1564 W., dated 17th November 1911. The opening of a new farm at Mangallur, in the Mayavaram taluk of the Tanjore district, was sanctioned in G.O. No. 2536, Revenue, dated 24th August 1911. The land for this farm, consisting of 94 acres, is to be leased from the owner for a period of 7 years. Considerable progress was made with the construction of the necessary buildings and the laying out of the farm before the close of the year and regular work has been commenced with the current year. A new farm at Anakapalle in the Vizagapatnam district was sanctioned in G.O. No. 3017, Revenue, dated 11th October 1911. The land for this farm, measuring 41 acres, has not as yet been acquired and handed over by the Revenue Department. The acquisition of an additional 42.61 acres for the extension of the Nandyal farm was sanctioned in G.O. Mis. No. 2330, Revenue, dated 18th September 1911, and this land has since been taken over by this department. The Bezvada farm which had been taken over from the Kistna District Board was handed back to that body, having been found to be useless for the purposes of the department—vide G.O. Press No. 2682, Revenue, dated 4th September 1911. Proposals for the abandonment of the Bellary farm were submitted in letter Dis. No. 433, dated 2nd March 1912, and this has since been sanctioned in G.O. No. 1675, Revenue, dated 5th June 1912. The Hindupur Agave plantation was abandoned in G.O. No. 965, Revenue, dated 3rd April 1911, the work there having been completed.

II.—AGRICULTURAL EDUCATION.

7. The second batch of students admitted in 1909 completed their three years' course at the end of the year under report and were examined in agriculture by Mr. A. McKerral, Deputy Director of Agriculture, Burma, in Veterinary Science by Mr. D.A.D. Aitchison, Principal of the Madras Veterinary College, and in Agricultural Engineering by M.R. Ry. Rajagopalaswamy Mudaliyar of the Pumping and Boring Establishment, assisted by the Agricultural College Professors in each case. Ten obtained the Diploma out of 12 who appeared. The two failures were in Veterinary Science and were mainly due to failure to benefit by the practical class work. The examination of the second year students in science was conducted by Mr. F. J. Warth, the Burma Agricultural Chemist and Mr. Southern, Acting Deputy Director of Agriculture, Southern Division, with the help of the College staff. 14 students passed out of the 16 who appeared.

The third-year students made two tours—one in the West Coast districts and one in the Telugu countries. The Principal accompanied them on both the tours. The Deputy Directors, who made the usual two individual examinations of all students in practical agriculture, noted that their tours had had a good effect on the third-year students. A great defect noticed by the Deputy Directors is a lack of intelligent inquisitiveness and power of independent thought, which is, I fear, a temperamental defect of the Indian student which must always make it difficult for him to benefit fully from a practical education.

8. It will be noted that only ten diplomates were obtained this year out of a possible 20, the maximum number in each year's class. Out of the 20 students selected in May 1909, five failed to join at the last moment. Substitutes were obtained for two of them, but, on the other hand, four more withdrew before the end of their first year, so that only 13 remained then. A similar wastage has been taking place in the other years, so that the batches who entered in 1910 and 1911 have been reduced to 16 and 15 respectively. This wastage is partly due to resignation and failure to join at the last moment and partly to the necessity of sending down the students who are unable to cope with the education in pure and applied sciences which occupies the first two years. It has been found by experience that many students of the land-owning classes, who take kindly to the purely agricultural side of the present course, are repelled by the scientific side especially by the practical work in pure science. After a full discussion of the matter with the college staff, I have recently submitted proposals for revising the present diploma course by lengthening it to four years, and by dividing it into a preliminary two years' agricultural course, with lectures in popular sciences but no laboratory work, and a further two years' scientific course. It would be possible to admit 40 students to the preliminary course as the numbers would not be restricted, as now, by the laboratory accommodation available. From these it should be possible to select each year 20 who would be capable of going through the further two years' scientific course successfully. It is hoped that under such a scheme both the number and the quality of the diplomates would be improved, and at the same time the demand for a less scientific, agricultural course would be met.

9. The joint hostel mess continues to be a success. The construction of a special dining hall for this has been sanctioned in G.O. No. 459 W., dated 26th March 1912. During the year the Principal prepared an illustrated College Calendar which it is intended to republish yearly as a continuous record of the college. The first edition has recently been published. The publication of a journal by the students' union has been sanctioned in G.O. Mis. No. 229, Rev., dated 29th January 1912. I have been specially struck by the cordial relations existing between the staff, both European and Indian, and the students at the college. The latter derive much benefit from their intercourse with the former out of class hours, on the playing fields and elsewhere.

10. *Non-official visitors.*—Three visits were paid from non-official visitors during the year. Their remarks have been forwarded to the Board. A revised list of honorary visitors was published in G.O. Press No. 3610, Revenue, dated 4th December 1911.

III.—RESEARCH AND EXPERIMENTS.

(a) AGRICULTURE.

11. Full details of the research and experiments in agriculture carried out during the year will be found in the scientific reports of the several agricultural stations which are published separately. The results are also referred to in the administration reports of the Deputy Directors and the Principal, which are printed as appendices to this report. The experiments will now be briefly enumerated and the results obtained summarised. It must be remembered that in the case of crops which are harvested after the close of the official year, the results now discussed refer to the crops of 1910-11 which were harvested in April or May 1911.

12. *Sugarcane—Varieties.*—A number of varieties of exotic and indigenous canes were tested against each other at Samalkota, Palur, Coimbatore and Taliparamba. The canes were analysed by the Agricultural Chemist or his Assistants and the absolute and relative sugar-yielding capacity of each variety determined. At Samalkota the Barbados cane B. 208 yielded at the high rate of 43.9 tons of canes yielding 5.6 tons of raw sugar per acre. Unfortunately this cane is found to be more liable to disease than the lower yielding Red Mauritius cane which has already been distributed throughout the Gōdāvari delta. At Palur the season was a bad one for cane so that little reliance can be placed on the results obtained. At Coimbatore the red and ashy Mauritius cane gave the best results of the varieties tested. At Taliparamba B. 208 showed itself the variety best suited to the climatic conditions of the West Coast.

Seed rate.

An experiment was made at Coimbatore to test whether the high local seed-rate of 35,000 setts per acre is necessary. It was found that 20,000 setts per acre gave a better crop than 10,000, although *a priori* the latter number was thought to be ample. This experiment is being repeated.

Manurial Experiments.

The experiments on the effect of chemical manures in conjunction with castor cake on sugarcane at Samalkota have now proved that the chemical manures do not increase the yield on this land. These experiments will therefore be discontinued. The experiments on the use of lime and cattle manure are being continued. At Coimbatore the experiments were made to test the relative efficiency of six nitrogenous manures which were applied in quantities which supplied 100 lb. of nitrogen per acre. It was found that fish manure gave the best results both in quality and quantity of jaggery.

13. *Ground-nut—Varieties.*—At Palur tests made over the last four years have shown that the local Mauritius variety, which is that commonly raised throughout the Presidency, yields, when properly cultivated, more than any of the exotic varieties that have hitherto been tried. The only exception to this is that the Senegal variety gives a better yield as an irrigated crop.

Rotation Experiments.

It has been shown that about Rs. 50 per acre more value can be obtained by growing groundnut mixed with a cereal such as cumbu or tenai each year rather than by rotating it with such a cereal in alternate years. The conclusion reached last year that it is better to vary the cereal in successive years has been confirmed. With irrigated groundnut an increase from 700 to 1,754 lb. per acre was obtained by rotating with Cambodia cotton. This result requires further confirmation, however, before the increase can be accepted as being entirely due to the rotation.

14. *Cotton—Selection.*—The line on which the selection of plants which give a higher yield per acre and a better percentage of lint to seed than the average is being carried on at the agricultural stations of Bellary, Hagari, Nandyal and Koilpatti was described in detail in paragraph 22 of the report of this department for 1909-1910. This work is being steadily persevered with so that the seed that is issued to the public may improve year by year. The best of the Bellary selections, one of which gave 33.9 per cent. of lint as against the usual local 23 per cent., have now been transferred to Hagari, where selections yielding 28 or 29 per cent. of lint are being grown. At Nandyal one of the selections gave 32.4 per cent. of lint. At Koilpatti, Uppam selections continued to show little promise, the lint being coarse in all cases. The Karunganni selections, however, continue to improve and two or three good strains appear now to be established. The report of the Director of the Imperial Institute states that "the Karunganni cotton is thus seen to approximate in fineness to Egyptian cotton." The Imperial Cotton Specialist values the lint of some of the Karunganni selections at about 18 per cent. above the value of the Uppam cotton. The yield of kappas per acre of these selections is also generally higher than the yield of the unselected crop, so that the object of this work, i.e., the permanent improvement of both the gross yield of kappas, the net yield of lint, and the quality of the lint, in all the important cotton tracts, is being steadily attained. It has, however, been realised this year that cotton plants in the field cross fertilise each other to a greater extent than had been suspected hitherto. This fact makes the raising of pure strains a more arduous task than had been anticipated as there is always a tendency for a selection to revert to the general type by crossing. This work would be greatly facilitated by the assistance of a whole-time Economic Botanist.

Rotation, mixing, etc.

The effect of rotating cotton with a leguminous crop, horse-gram, was shown to be beneficial at Nandyal. At Coimbatore a mixture of cotton and tenai in alternate rows gave slightly better results than a similar mixture of cotton and horse-gram. Experiments to determine the best spacing at which cotton should be drilled showed that a distance of $1\frac{1}{2}$ feet between the lines gave the best results.

15. *Paddy—Varieties, selections.*—A large number of paddy varieties were tested *inter se* at Samalkota, Palūr and Coimbatore. "Sambalpur" proved a good variety at the two former stations. Each of the local varieties is, however, found to contain a number of different types of varying qualities and the work which is now being undertaken is the selection of single plants possessing the best qualities of each type and the multiplication of the seed of each plant separately year by year, until a sufficient stock of pure seed of each type is obtained to stock seed farms, from which seed can be distributed to the public. A commencement with this work has now been made and important results in the improvement of the local paddy crops should follow in a few years' time.

Seed-rate.

Experiments to determine the best seed-rate for seed-beds and the best distance apart for planting seedlings were carried out at Samalkota, Coimbatore and Palūr. The results which are too many to summarise here, bear out the conclusions already arrived at that the methods adopted by ryots involve a waste of at least three rupees an acre in seed on the average. The experiments are designed to ascertain the optimum spacing for each variety in each tract.

Age of seedlings—Methods of Cultivation.—Experiments were also carried out to ascertain the best age at which to transplant seedlings, and to test the comparative merits of puddling *v.* non-puddling, hot weather ploughing *v.* fallow, drying between each watering *v.* continuous flooding. These experiments must be continued before definite results can be expected.

Manurial

(a) *Concentrated manures.*—The "Patti-mannu" experiments in Kistna confirmed the results obtained before, i.e., that potash is usually not required but that superphosphate or a mineral phosphate is profitable. Check experiments carried out at Coimbatore which had confirmed this result in the previous year, yielded different results this year, superphosphate alone giving poor results. At Samalkota the experiment showed that superphosphate has a good effect when added to a nitrogenous manure, such as castor cake or sunn hemp, while potash either had no effect or else was deleterious. Ammonium sulphate increased the yield, but not sufficiently to cover the costs of the manure. The good effect of liming was found to persist until the second year. At Coimbatore the best financial results were given by black castor cake at 500 lbs. per acre. Bone-meal also gave good results, and fish manure, though not so good as in last year, proved itself to be a cheap and efficient manure. Calcium cyanamide also gave promising results. Potash appeared to be not only unnecessary but actually to decrease the yield.

(b) *Green Manures.*—Comparative tests of various green manure crops, sunn hemp, (*Crotalaria juncea*), daincha (*Sesbania aculeata*), Teegapesalu (*Phaseolus mungo var.*), Narikoramani (*Phaseolus aconitifolius*) were carried out at Samalkota, Palūr and Coimbatore. At Samalkota daincha yielded 14.7 tons of green matter per acre and at Coimbatore sunn hemp gave 7 tons per acre. In all cases the great value of such green manures to paddy was demonstrated. At Palūr the total yearly yield of paddy from the farm has increased from 21,852 lbs. to 40,030 since 1907-1908 and most of this increase must be attributed to green manuring. Individual experiments showed increases of from 50 to 100 per cent. in the yield of grain as the result of green manuring. There is still much to be learnt however as to the effects of continuous green manuring, the necessity of varying the green manuring crops, the necessity of supplementing with artificial manure, etc., and experiments to test these points are being commenced at Palūr and Coimbatore.

16. *Sorghum.*—Selection work on sorghum was continued at Hagari but was spoilt this year by bad germination. The Coimbatore variety 'Periamanjai' was found to be an excellent fodder crop at Koilpatti. The 'Thalaivirichan' variety gave the phenomenal yield of 1,796 lbs. of grain at Coimbatore as the result of deep ploughing.

Ragi.—Varieties of ragi were tested at Coimbatore and experiments to ascertain the best seed-rate were also conducted.

Wheat.—Experiments on irrigated wheat at Coimbatore showed that the local 'bed' system of irrigation gave better yields than a ridge system.

Cumbu.—Selection work on cumbu was continued at Koilpatti. The Transvaal cumbu tried at Coimbatore was fairly successful but was found to cross widely with the local variety.

Pepper.—This was as usual the principal crop at Taliparamba. The response of this crop to manuring and good cultivation is very remarkable. A plot regularly manured with lime and leaf mould has increased its yield from 5½ Madras measures in 1907 to 113½ Madras measures in 1912.

Other crops.—Onions, ginger, turmeric, maize, Bengal gram, tenai, Cambodia cotton, red gram, castor, tobacco, gogu, were grown at various stations to ascertain the best method of cultivation, irrigation, and manuring, and also to test the possibility of introducing particular crops into districts where they are now unknown. Mr. Barry continued his cultivation of exotic tobacco on 150 acres of Lanka land in Gōdāvari.

17. *Special cultivation experiments.*—The effects of continuous cropping with tenai are being tried at Hagari. The rotation experiments with cotton at Nandyal and ground-nut at Palūr have already been alluded to. The effects of mixed cropping with a cereal and a pulse are being tried at Koilpatti. The benefits of ridge planting, of trench irrigation v. flat bed irrigation, of deep ploughing and of drilling v. broad casting were tried at various stations.

Special manurial experiments.—The researches into the best methods of preservation of cattle manure were continued at Koilpatti and the box system continued to give the best results both in quantity and quality of manure.

Permanent manurial experiments.—These were in progress at several stations. Those at Bellary were brought to a conclusion this year and the results obtained were reviewed at length in the scientific report. The general conclusion was that, for black cotton soils in Bellary, the application of chemical manure is of little use; the application of organic manures is beneficial; and of these cattle manure prepared on the box system is the best. The effect of magnesia and of sheep manure were tested at Hagari, and the relative merits of sheep and cattle manure at Nandyal. Green manure on garden lands was tried at Koilpatti and Coimbatore.

Live Stock.—A flock of sheep has been started at Hagari with a view to the eventual improvement of the local wool bearing breed. At Coimbatore the cattle and sheep breeding work continued. It appears that it will be possible to breed animals which will be as good as the best of those bred in the true Kangayam country.

(b) CHEMISTRY.

18. The report of the Agricultural Chemist is printed in Appendix III to this report. The number of analyses performed for private individuals has continued to increase. Mr. Harrison and his Chief Assistant M.R. Ry. M. R. Ramaswami Sivan Avargal have completed their joint research on the black cotton soils of Madras and their results will shortly be published. Mr. Harrison's researches on the gases evolved from land occupied by a paddy crop were continued during the year and already point to very interesting results, which may have an important bearing on the question of the manuring and irrigation of paddy. These researches have not yet reached a stage suitable for publication however. The "Patti-mannu work" is dealt with in paragraph 15.

(c) BOTANY.

19. The report of the Government Botanist is printed as Appendix IV. Owing to the prior claims of teaching and herbarium work research was mainly confined to the study of Cambodia cotton and sugarcane. With Cambodia cotton the work consists of the careful analyses of the several characters exhibited by various crosses with a view to discover the Mendelian characters, and so eventually to evolve a plant possessing those characters which are specially desirable in a field crop. The work was much hampered by an attack of stem weevil and has not yet reached any conclusion. The Government Botanist has been engaged on special researches into sugarcane during the last months of the year preparatory to his taking charge of the special sugarcane station which is expected to be opened shortly at Coimbatore for a period of five years.

(d) ENTOMOLOGY.

20. Details will be found in paragraph 8 of the Government Botanist's report in Appendix IV. The three Entomological assistants continued to work under the Government Botanist, who was ever assisted by the Imperial Entomologist.

The first Entomological assistant devoted himself mostly to sericulture which is dealt with in para. 22 below. He also made a study of the life history of the stem weevil on Cambodia cotton at Coimbatore. The second assistant investigated certain of the insect pests found in the northern half of the Presidency. He was mainly engaged in further investigation into the life history of the Deccan grasshopper and of its natural enemies. Experiments were made with various methods of trapping this pest, and bags of the pattern devised by Dr. Coleman in Mysore were found to be the most satisfactory on the whole. A regular campaign against the pest will be organised this year by the Madras Entomologist. The third assistant made investigations into various crop pests met with in his tours in the southern half of the Presidency. An enquiry received from Government as to the necessity of regulating the destruction of wild bees in coffee planting districts could not be investigated this year as the coffee flowering season was over. The Entomologist will study the relations between bees and the coffee flower next season.

(e) MYCOLOGY.

21. The report of Mr. McRae, the Madras Mycologist, is printed as appendix V to this report. Mr. McRae was mainly engaged with the bud rot disease of palmyras in the Gōdāvari and Kistna districts. He has been specially investigating the cases, in which the disease does not attack the central growing point, and so kill the palm at an early date, but attacks the expanding leaves some distance above the growing point. He has proved that such palms may live as long as 3½ years before they succumb to the disease. Each leaf as it expands, and one expands every month as a rule, bears a row of characteristic spots across it. These spots bear spores which are widely distributed by the wind. These trees, which form about two or three per cent. of the trees infested, are thus virulently infectious, yet they are allowed to stand, and are not cut, under the present system of operations, because trees can only be cut with the consent of the tree owners who do not believe that such trees are diseased and eventually doomed. A proposal to introduce legislation to enable such trees to be cut has been negatived in G.O. No. 527, Revenue, dated 28th February 1912. Every attempt is being made to educate the tree owners to appreciate that their best interests lie in following the advice given them in these matters, but I am not sanguine of real success being attained on these lines. In South Malabar the spraying of arecanuts against Koleroga disease was demonstrated to the garden owners, who are now taking readily to this method of preserving their crops. Sugarcane smut was investigated at Samaltota and the fieldwork on paddy smut was continued. It was found that cholam smut could be successfully combated by the use of a copper sulphate steep for the seed at a cost of about 1 anna per acre sown. Other fungus diseases were investigated, 24 parcels of diseased plants were received from the public and reported on, and the herbarium collection of parasitic fungi was enlarged.

(f) SERICULTURE.

22. The possibility of improving and extending the mulberry silk weaving industry of Kollegal were investigated by the first Entomological Assistant who paid long visits to the chief centres of the industry and embodied the results of the investigation in a draft bulletin. A small experimental brood of mulberry silk worms raised at Coimbatore was a failure, the eggs having been pebrinised. Seven broods of eri silk worms were raised at Coimbatore and consignments of prepared cocoons was sent to certain spinning mills. These were unable to make use of the product. This silk is regularly spun and woven in Bengal so that there can be no doubt that it can be spun and woven in Madras. It has been demonstrated that cocoons can be raised successfully at a small cost, and all that is wanted to establish this as a cottage industry is the organisation of a small spinning and weaving factory at a suitable centre.

(g) PISCICULTURE.

23. Pisciculture is dealt with by a separate department of Fisheries. Details of the work done during the year will be found in appendix VI.

The following is the review, by Sir Frederick Nicholson, of the work of the Fisheries Bureau:—

Fresh water.—The trout, chiefly *S. irideus* hatched and planted out on the Nilgiris by Mr. Wilson, Piscicultural expert to the Fisheries Department in 1909–1910, had so developed by 1911 that the waters were thrown open to licensed anglers, and many fish were caught, the largest of which weighed 5½ lbs.; the head of fish is very large. The upper waters of the Bhavani and Moyar continued to be conserved against illegal practices, such as dynamiting, poisoning, etc., with the result that there is a marked improvement in the visible quantity of fish. On the plains several large tanks which always contain water were stocked with good fish, and preparations made for stocking others such as the Salem water-works reservoir; two very important schemes were also brought to the report stage and one of these (Kanigiri, Nellore district), was submitted to Government.

The main practical work was done at Sunkesula (Kurnool), at the ancient which feeds the Kurnool-Cuddapah canal which, as well as other waters, it is intended to stock for the 200 miles of its length. This fish farm was brought to practical completion, as the breeding arrangements, stock and fry ponds, were in regular use during the year and a large stock of breeders, chiefly carp of various species and murrel (*Ophiocephalids*) are on hand ready for next season's work; there is, indeed, a surplus of stock fish which must be sold off. At this farm, moreover, the bionomics of our Madras fresh-water fish are being carefully studied, methods of hatching, rearing, and transport suitable to tropical conditions and the nature of the various fish, are being devised, and the fish most suitable for cultivation are being determined. In matters both of pure and applied piscicultural science, the fish farm was duly utilised.

All fresh water operations, whether actual pisciculture or investigations of schemes were devised and carried out by Mr. H. C. Wilson.

Marine.—Actual piscicultural operations were confined to the experimental oyster farm at Pulicat started late in 1910–1911 and now holding many thousands of good oysters, mature though not exceeding 20 months in age. The farm resulted from Mr. Hornell's experiments at the Ennore experimental station and his visit in 1908 to the Arcachon oyster grounds or farms; during the year Mr. Hornell devised various simplifications and economies in the original scheme and enough is now known to warrant larger work.

During the year Mr. Hornell examined and favourably reported on various sites suitable for ordinary marine fish farming in the lagoons and back-waters; a site containing an area of about 160 acres was finally selected at Tuticorin and has since been sanctioned by Government. This site has the advantage of accessibility and of continual supervision by the fisheries staff as well as of proximity to a large market; it is intended to examine the possibilities of breeding some of our best salt water fish in comparative captivity and of studying the bionomics of as many food fish as possible as well as of the clam and pearl oyster. The above farm is the outcome of Fisheries Bulletin No. 6 published in 1911 in which Mr. Hornell described methods of fish farming in France and Italy with suggestions for practical work in Madras, upon which the Madras Government desired that a suitable site should be selected for a fish farm and a plan and estimates submitted.

A scheme for the creation of a breeding reserve of pearl oysters on the Tinnevely coast, and for inducing the growth of pearls, was also prepared and sanctioned.

Mr. Hornell, as Marine Assistant and Superintendent of the Pearl and Clam Fisheries, devised the above operations and schemes.

IV.—DEMONSTRATION, AID TO THE PUBLIC, SHOWS, AGRICULTURAL ASSOCIATIONS AND GENERAL PROGRESS.

24. **Sugarcane introduction.**—The demand for red Mauritius cane was small in Godavari as the delta is now practically wholly planted up with this cane. The area under this cane near Nellikuppam continues to increase and is now about 3,000 acres. This year the Nellikuppam sugar factory was manufacturing sugar direct

from the cane. Much of this cane is being grown on garden lands under well irrigation. The sugar industry in South Arcot is now on a firm basis and is capable of great expansion. In Malabar the red Mauritius cane originally introduced by the department is being replaced by Barbados No. 208 which is better suited to the West Coast conditions. The area under cane this year is between 75 and 100 acres. Ryots are purchasing iron mills and are learning how to make jaggery. They are given every assistance possible in this matter, the coolies trained on the farm at Taliparamba being sent out to supervise the work where necessary. There was a great demand for setts for planting this year, over 127,000 being sold. At Coimbatore a demonstration of this year's cane crop and of jaggery making was held in April last and was largely attended by ryots who were entertained by the local Agricultural Association.

25. **Cotton.**—Improvement of seed and seed distribution.—Owing to a poor season in 1910–11 the quantity of seed received from the 574 acres of seed farms in Tinnevely was less than what has been expected. There was great competition for this seed and the whole stock of 94,963 lbs., sufficient to sow 11,200 acres, was sold at the rate of 10 rupees per pothie of 50 lbs. The ryot can ordinarily get his own seed back from the gin for Rs. 6 per pothie. These figures show what value the ryots put on the improved seed supplied from our seed farms. The seed depots are shifted year by year so that the area under the improved Karunganni crop increases steadily. The Tuticorin Chamber of Commerce informs me that the improvement in the quality of Karunganni cotton noted last year is still maintained. As the selection of better type cottons proceeds at the Koilpatti Agricultural station so the seeds supplied from that agricultural station to the 400 acres of seed farms improves, and in the succeeding years the seed sold to the public from the seed farms carries the good qualities far and wide. In this way successive waves of improvement proceed outwards from the Agricultural station.

In Kurnool and Bellary similar work is in progress. Last year 44,115 lbs. of improved seed were sold. The ryots fully realise the value of this seed and demand, and get, from Rs. 4 to 5 a kantlam (1,500 lbs.) extra on the kappas grown from this seed on account of the higher ginning percentage. The work here will be greatly expanded during the current year, 1,200 acres of seed farm being put down. A marked effect on the general crop of these districts will, it is hoped, soon be noticed. The total net cost to Government of these operations during the working season 1911 was only Rs. 6,013, the sale of lint and seed having accounted for the remainder of the gross expenditure of Rs. 40,928.

Cultivation.—The introduction of drilling continues to make good progress in Tinnevely. A total of 3,605 acres were sown with the drill this year. Of this 818 acres were under cumbu as against only 70 acres last year. The ryots have been greatly impressed with the value of the drill for cumbu although still rather sceptical about its use for cotton. However once it is widely taken up for cumbu, as it undoubtedly will be, it is only a question of time before the drill is universally used for cotton also. Experiments on the Koilpatti farm leave no doubt as to the relative value of the two methods, drilling and broadcasting. In Kurnool the introduction of the larger Bellary plough is not making much progress. This pattern of plough is not entirely suited to the local conditions. The Deputy Director of Agriculture, Northern Division, has been in consultation with a representative of the plough-making firm of Messrs. Ransomes, Sims and Jefferies, and has also visited the cotton farm at Dharwar in the Bombay Presidency, with a view to obtaining a type of plough more suited to the work required of it. As labour and cattle got more expensive every year all things appear to point to the solution of the deep ploughing question being found in the introduction of some type of power plough on the black cotton soil areas. This development is not being lost sight of by the department.

26. **Cambodia Cotton.**—Cambodia cotton still continues to spread. The estimated crop in the south this year is 80,000 bales as against 33,000 bales last year. In addition it has been tried further north in Bellary, Kurnool and other districts, and has been a success everywhere. Over 31,000 lbs. of seed were sold and a still larger stock will be held this year. The yield per acre continues to be as good as ever but unfortunately the price has dropped this year to the level of Tinnevely cotton, or even below. This is partly due to the fact that long stapled American

cotton, with which Cambodia competes, has been cheap this year, so much so that one firm has been importing it for use in the local mills. But the fall of price is also due to a deterioration of quality of which most of the mills complain. I have given this matter serious attention and have looked into it at the ginneries and mills in Tinnevely, Coimbatore, Madras and Kurnool. There is no doubt that much of the Cambodia lint this year is not fit for spinning the finer counts (40 s.) which were spun from it last year. This is partly due to admixture with country cotton and partly to bad quality of fibre. The admixture is partly deliberate,—the dealers hoping to sell a mixture at the price of pure Cambodia which last year was above that of country cotton,—and is partly due to accidental mixture in the ginneries.

But it is mainly due to the carelessness of the ryot who sows mixed seed and who will not trouble to root out the country cotton plants from his Cambodia crop. It cuts the ordinary ryot to the heart to pull up any growing plant that may yield some produce. He affirms that he will keep the produce of the country cotton plant separate when harvesting, but naturally the coolies harvest both together and the result is a mixed crop of uneven staple, which is worth less than pure country cotton, to say nothing of pure Cambodia. A special leaflet No. XVII of 1911 has been published on this subject, and a large quantity of pure seed will be stocked this year. The drop in price has been a good lesson to the ryot and it is hoped that he will learn wisdom and keep his crop purer in future.

The deterioration in the quality of the fibre is a more serious matter. It does not appear to be universal but is mostly met with in Coimbatore where the crop has been very badly attacked by insect pests. This has been specially the case with crops left on the ground too long, or grown near the perennial 'Borboun' cotton of Coimbatore in which pests are endemic. Cambodia cotton will continue to give a crop in the second year if left in the ground. The crop is not good and the plants swarm with insect pests, but the trouble of ploughing and replanting is saved so that some ryots are adopting this practice. In the case of the ordinary country cotton the ground is bare for at least three months in the year and in this time most of the insect pests perish. But if a field or two of Cambodia is left on the ground during this period the starving insect pests naturally swarm to it and not only damage that crop but are carried on until the next year's country cotton crop has grown sufficiently to afford them food. It is thus easy to understand how the growing of a few fields of cotton as a perennial crop may have a very large effect on the prevalence of insect pests. The newly joined Entomologist is making a special investigation of the problem at Coimbatore. I believe that similar trouble in the West Indies was met by a Pest Act making it illegal to carry cotton on the ground beyond a certain date, and I am not at all sure that some such Cotton Pest Act will not be needed in this country in a few years.

I am arranging to send a series of samples of Cambodia to the Imperial Cotton Specialist so that he may investigate as to whether there has been any real deterioration of staple apart from that caused by insect pests. If there has been, and if Cambodia develops a general tendency to deteriorate in staple, it may yet be possible to breed an improved strain which can be kept up and distributed by means of seed farms.

27. *Paddy seed selection.*—So far little has been done to improve the seed of this crop. Single plant selections of the best strains have however been made and in time it will be possible to organise a system of distribution of improved seed just as in the case of cotton. The improvements that have proved successful in paddy are the reduction of the seed rate (single planting) and the introduction of green manuring crops.

Seed-rate.—It has been conclusively proved in the agricultural stations that 20 lbs. of paddy sown thinly in a seed bed is sufficient to provide seedlings for planting out an acre, and that an acre so planted will yield more than if planted in the wasteful indigenous way by which anything up to 150 lbs. of seed are used. There are over 10,000,000 acres under paddy in the Madras Presidency every year. Taking as a conservative estimate that one half of this area is transplanted and that 30 lbs. of seed paddy are used per acre on the average, then it follows that the universal adoption of the reduced seed rate advocated by the department would result in a saving of 300,000,000 lbs. of paddy, worth say Rs. 1,00,00,000 *per annum* in seed alone. The Agricultural Department costs altogether less than 4 lakhs *per annum*, i.e., less than 4 per cent. of the possible saving to the ryot under this head alone. The

practice of single seedling planting is spreading rapidly as the result of the efforts of all officers of the department. This is specially the case in the southern districts of Tanjore, Madura, Tinnevely, South Arcot, Coimbatore, Malabar and Chingleput. In the Kumbakonam division alone the Divisional Officer ascertained that this year there were 5,000 acres, distributed over 144 villages, in which the system had been adopted. Steps have since been taken to ascertain the total area throughout the Presidency, but the figures have not yet been received. I have little doubt that, now that the system has been widely known, it will only need a few years more for it to become practically universal.

Patti mannu work.—The demonstration to the ryots that chemical manures especially phosphates are as good substitute for the patti mannu, or village earth, which is yearly becoming scarcer, were continued in the Kistna district this year. The results were satisfactory and the work here will now be closed as the ryots have grasped the point and are beginning to buy the chemical manures that are offered to them by private enterprise. The same work will now be taken up in the Guntur district, to the south of the Kistna river, where the conditions are similar.

Green Manuring.—In 1911, a Committee sat at Madura to consider the question of the supply of leaf manure from the reserved forests. This matter had come to a head in Madura where the forests were inadequate to meet the demand of the newly opened Periyar irrigated tract, and were rapidly deteriorating owing to the steady removal of the leaves which should have gone to enrich the soil. It was decided that the proper policy to be adopted in the future was to raise the nominal fees which have hitherto been charged for the removal of leaves from the forests to something like the true market value of the manure, and to encourage ryots to supply their own wants by growing crops of green manure on their lands between successive paddy crops—*vide* G.O. No. 1605, Revenue, dated 29th May 1911.

In pursuance of this policy the charge for leaves has already been raised in several districts, and the Agricultural Department is doing its utmost to supply a sufficient stock of green manure seeds and to instruct ryots in the practice of growing these crops. About 26,000 of Madras measures of green manuring seeds were disposed of last year mostly in Tanjore and Madura where the demand for manure is heaviest. The prices at which these seeds are sold are fixed so as to gain about 10 per cent. profit, in order to leave room for private enterprise. This year a Madura merchant commenced stocking and selling wild indigo seed, which is gratifying. It would be impossible for the department to satisfy the large demand that must soon spring up for such seeds. We can only show the way and it will be for private or co-operative enterprise to take the work over.

28. A consolidated leaflet on paddy cultivation, uniting in one publication all the advice which the department is prepared to give on the question of cultivating and manuring paddy, has been published as leaflet No. 18 of 1911. So far as paddy is concerned the work of the department for the next several years will consist in demonstrating and preaching the principles laid down in this leaflet.

Cattle shows.

29. Cattle shows were held at Ongole and Tiruppur during the year. Mr. Couchman attended the show at Tiruppur in June 1911 and I attended the show at Ongole in March 1912 and also shows at Madura and Tiruppur in May and June 1912, respectively. I am unable to agree entirely with the remarks of Mr. Couchman last year as to the lack of practical value of these shows, but at the same time I must admit that I have not seen many of them. The Madura show was certainly a farce, but the Ongole and Tiruppur shows appear to have some practical value. Mr. Sampson has dealt with this subject in his report on his cattle survey of the Madras Presidency which he has recently completed.

Agricultural Associations.

30. The only associations which appear to take any active interest in their work are those of Kumbakonam, Malabar and South Canara and possibly Ganjam. The rest are either extinct or almost so. I had been endeavouring to galvanise the Central Agricultural Committee to life and get it to take an interest in a branch of work in which there is much to be done, i.e., the combination of the co-operative credit and agricultural improvement movements. I am afraid however that nothing will result except talk and resolutions. The constitution of the associations was wrong from the beginning and nothing can be done now except by beginning from

the bottom and forming associations of real ryots in the villages. These already exist to some extent in the rural co-operative credit societies and I am arranging to get into touch with these as a first step. The Co-operative Credit department and the Agricultural department have however been working in separate water-tight compartments in the past; for instance, I have not been getting their bulletins nor has the Registrar of Co-operative Credit Societies, much less his subordinates, been getting any of our publications. This has now been rectified and it is to be hoped that these two departments will be able to work together in the future in their joint task of reorganizing the village system of credit, production and distribution.

General Progress.

31. The amount of correspondence between the department and literate ryots grows steadily larger. A perusal of this correspondence shows that the educated cultivating classes are coming to appreciate fully the advantages which they can obtain in the way of advice and assistance from the department. Prices have been good in recent years and ryots are not debarred by the cost from buying improved implements or taking up expensive crops, once they are convinced of the advantages to be obtained. There is no doubt that a very good start has been made and that most literate ryots at least know that there is an Agricultural department to whom they can go for advice and assistance. There remains, however, the great bulk of illiterate ryots who can only be reached by word of mouth or practical demonstration. The latter is supplied by the agricultural stations and the seed farms, and will also be supplied by the example of their literate brethren who have adopted the new methods. The former is supplied as far as possible by touring officers who preach the new methods in the villages and at shows and fairs.

V.—AGRICULTURAL ENGINEERING.

32. In the Madras Presidency much of what is really agricultural engineering is dealt with by the officer, formerly termed the Director of Industries, who is now known as "The Officer in charge of Pumping and Boring Operations." The boring of wells and the pumping of water for irrigation by oil or wind power, although essentially agricultural matters, have always been held to fall under the province of the Department of Industries. Similarly the matters of cotton-ginning, rice-hulling and sugarcane-crushing have been mostly left to that department. I am of opinion that in the future the Agricultural department must pay more attention to the mechanical engineering side of agriculture which is getting more important every year with the rise in prices, and in cost of labour and cattle, and the possibilities opened up by the spread of the co-operative movement. So far the activities of the Agricultural department have mostly been devoted to the popularising of improved indigenous implements, such as the Sindh plough and the triangular harrow, and the cheaper types of light iron ploughs. A new chaff-cutter was tried at Coimbatore and found to work well with sorghum straw but not with green stuff. A visit has been paid to this Presidency by a representative of the famous plough-making firm of Messrs. Ransomes, Sims & Jefferies, and as the result of practical trials and discussions between him and Messrs. Wood and Hilson it is hoped that types of improved ploughs specially suited to the needs of this country will be evolved and placed on the market.

VI.—PUBLICATIONS AND SUPPLY OF INFORMATION.

33. A bulletin, No. 63, on the principles of paddy-manuring by Mr. W. H. Harrison, the Agricultural Chemist, and another, No. 64, by Mr. G. R. Hilson embodying the results obtained at the Hindupur-Agave plantation, were issued during the year. The following leaflets were issued during the year :—

No.			
I.	Instructions for sending plants attacked with parasitic fungi.	Mr. W. McRae ...	English.
II.	Note on sugarcane cultivation on the West Coast.	M.R.Ry. Unnikrishna Menon.	Malayalam.
III.	A dialogue on single planting of paddy.	Mr. Kolandavelu Udayar.	Tamil.
IV.	A note on wild indigo	Home Farm Superintendent, Sivagiri.	Tamil and Telugu.
V.	Bambachu and how to combat it.	Dr. C. A. Barber ...	English and Canarese.

VI.	Improvements in ryots' lands.	Mr. G. R. Hilson	Telugu and Uriya.
VII.	Advantages of using iron ploughs in black-cotton soils.	Do.	Telugu.
VIII.	A note on cocoanut beetles.	Dr. C. A. Barber	English, Tamil, Telugu, Malayalam and Canarese.
IX.	Manuring in the Kistna	Mr. G. R. Hilson	Telugu.
X.	Daincha	Mr. H. C. Sampson	English, Tamil and Telugu.
XI.	Cambodia cotton	Mr. G. R. Hilson	Canarese.
XII.	Note on potato crop	Messrs. McRae and Hilson.	English.
XIII.	Note on sugarcane cultivation on the West Coast.	M.R.Ry. M. Govinda Kidava.	English.
XIV.	The preservation of farm-yard manure.	Mr. W. H. Harrison	English, Tamil and Telugu.
XV.	Budrot in Gôdavari and Kistna districts.	Mr. W. McRae	Telugu.
XVI.	Small ginning factories	Mr. M. E. Couchman	English.
XVII.	The importance of sowing pure seed of Cambodia cotton.	Mr. H. Southern	English and Tamil.
XVIII.	Improvements in paddy cultivation recommended by the department.	Mr. R. Cecil Wood	English, Tamil and Telugu.
XIX.	Cotton	Do.	Do.
XX.	Sugarcane in South Canara.	Do.	English and Canarese.
XXI.	Sugarcane	Mr. R. Cecil Wood	English, Tamil and Telugu.
XXII.	Jaggery-making	M.R.Ry. D. Balakrishna Murti.	English, Tamil, Telugu, Malayalam and Canarese.
XXIII.	Ginger cultivation on the West Coast.	M.R.Ry. M. Govinda Kidava.	English, Malayalam and Canarese.
XXIV.	Paddy-manuring	Mr. W. H. Harrison	Tamil and Telugu.

34. A printed list of the publications of the department was also published and widely distributed. As the result of this a large number of requests for the issue of old leaflets and bulletins were received, showing that the publications have not been reaching all those who would have liked to receive them. I have therefore taken steps to organise the distribution of leaflets through the Collectors of districts on better lines and have also printed lists of the publications available, in the Agricultural Calendar which was published in March 1912.

Seventy thousand copies of the 1911-12 calendar were distributed and sold altogether, and it is hoped that the 1912 calendar will be even more popular. There is no doubt that this calendar forms one of the most useful means of communication between the department and the educated ryot.

VII.—MISCELLANEOUS.

35. *Conclusion.*—I am shortly to sever my connection with the Agricultural Department, the charge of which I have held during the past year, and I wish to take this opportunity of placing on record my opinion that the department is well on the right road to realise the immense possibilities that lie before it. Nothing more nor less than a revolution in the methods of local agriculture is to be expected. This revolution has already begun. The practices of buying fresh improved seed, of economising in seed rate, of growing green manure crops and of adopting suitable rotations are all now firmly established in various tracts where they were unknown hitherto. There is nothing to prevent these and other improved methods becoming universal in course of time. All that is needed is continued direction and organisation by a staff which must be increased *pari passu* with the spread of enlightenment. As I have shown in the case of one improvement alone, single seedling planting (*vide* paragraph 27 above), the gain to the ryot by these improvements must be reckoned in crores while the cost of the Agricultural Department is reckoned in lakhs. I submit that neither men nor money should be grudged to this department.

MADRAS,
1st July 1912.

G. A. D. STUART,
Ag. Director of Agriculture.

APPENDIX I.

THE ADMINISTRATION REPORT OF THE AGRICULTURAL COLLEGE
AND RESEARCH INSTITUTE AND THE CENTRAL FARM,
COIMBATORE, FOR THE YEAR 1911-1912.

College.—The college was in full working order during the year. The staff are still hampered by the unfinished state of the rooms, which yet remain to be furnished by the Public Works Department. Of the works mentioned in last year's report, only the Principal's office room has been completed. Furniture for the museum and library has partly arrived and is being fitted; the other rooms remain as they were.

The water-supply not only to the college but also to the whole of the quarters, remains in the precarious state described in last year's report, while the electric light is as yet unfitted. The scheme for collecting the rain water from the roof, has not yet been drawn up.

The fire-extinguishing apparatus has been installed, but in view of the shortage of water, it would probably prove of little use in case of an emergency, while practice is difficult for the same reason. A fire brigade has been organised among the college staff.

2. *Visitors.*—During the year, the college was honoured by a visit from His Excellency Sir Thomas Gibson Carmichael, who, though he was only able to spend a few hours here, was pleased to express his appreciation of what he saw. The Director of Agriculture visited the college six times, and the Deputy Directors three times. The list of honorary visitors was revised by the Government in December: the new list containing 25 names. There have been however during the year only four visits—M.R.Ry. Ramabhadra Nayudu came in May, M.R.Ry. Vengail Krishnan Nayanar in July, and M.R.Ry. Abraham Pandithar Avargal and the Mittadar of Oblinayakkanahalli and Bosinayakkanahalli, Salem district in March. Their remarks were duly forwarded. The late Hon'ble Mr. V. Krishnaswami Aiyar, C.I.E., C.A.I., paid a short visit to the college in August. The Court of Wards, as in the previous year, paid us a visit in July, and suffered defeat from the college cricket team.

3. *Students.*—The number of students at the commencement of the session was fifty, twelve of whom were in their third year, eighteen in their second year, and twenty in the first year. The work of the third year, which was largely field and shop work, was supervised by Farm Manager, D. Balakrishna Murthi who was able to devote his whole time to them. They performed two tours, one on the West Coast, and one in the Northern Circars. I accompanied them in each case, and was assisted by Farm Manager, Govinda Kidavu, and Farm Manager D. Balakrishna Murthi respectively. Of the second year, two students were removed at the close of the second term. This should have been done earlier, but my staff was unable to get the students' mark and conduct registers written up to date in time. Assistance has been asked for and it is hoped that an extra clerk will shortly be appointed to help in this work. One student of this class has resigned on the ground of ill-health, and one has failed in the first part of the Diploma, so that the class starts its third year with a strength of sixteen. The first year started full, but two students were removed for failure to profit by the instruction given. It is discouraging to be forced to reduce the classes in this way, but it is difficult in making the annual selection, to choose students of the agricultural classes, or who are directly interested in agriculture, possessing sufficient ability. It would be possible to pick a much cleverer class of students, but they would not in most cases be of the right sort, and it is felt that at present the latter is more important.

Applications for the coming year are again somewhat less, being only 75. The realisation of the practical nature of the work here is becoming more widely known, and prevents many useless applications, so that the applications this year are, I think, from more suitable candidates.

4. *Work—Agriculture.*—Further changes will be again necessary in the arrangement of the work for the third year. A Dairy course (see paragraph 10) will be added and each of the students will have to spend some time performing the ordinary routine duties of the Dairy. The system suggested by the Deputy Directors that the supervision of the different portions of the Farm should be so arranged that each student should manage the same portion at stated intervals throughout the year, was adopted, and has been effective in impressing on the students the progress of the seasons and the changing operations of the year.

Botany First year.—The Elementary Biology course was restricted last year to the first two terms, but in the present period it was found necessary to add one class a week during the third term.

(1) *Elementary Botany.*—The course consisted of 56 lectures and 63 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.*—Three weeks were devoted to a study of the more important groups of invertebrata. There were eight classes and the course was regarded as a preparation on the one hand for the course on the Biology of Farm animals in the third term and, on the other, for the course on Entomology during the second year.

Second year—Agricultural Botany.—There were about 70 lectures and 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.

Entomology.—This course consisted of one class of three hours, once a week, throughout the year. There were 28 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.—During the session, the first year students received 95 lectures in General Theoretical Chemistry (Inorganic and Organic) and 63 practical classes of 3 hours duration each. The second year students had 60 lectures on Agricultural Chemistry and 31 practical classes. The average attendance at the classes was very satisfactory and the course of instruction given was practically the same as that outlined in previous year's report.

The exercises given in the practical classes have been printed and bound up in book form and a copy is given to each student.

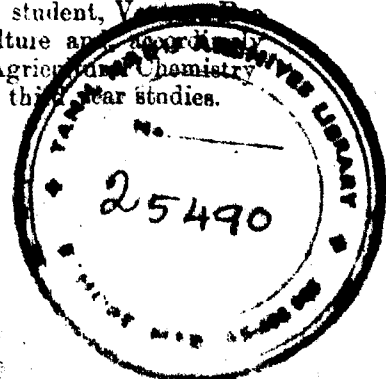
Mycology.—A course of 12 lectures and 12 practical classes was given to the second year students. The first six dealt with the life-history of one or two fungi and with general characteristics of fungi, the second six dealt with the principal diseases of the more important crops of the Presidency. The students now have an elementary idea of the nature of a fungus and of what it does to its host plant. They are in a position to observe a fungus disease on their crops and they know how to prepare material properly to submit it to the Mycologist for detailed examination. They have been shown how to apply simple remedies and will be able to carry out the instructions they get with regard to the diseases on which they ask our advice.

5. *Examinations.*—The examinations in both parts of the Diploma were conducted according to the scheme worked out last year, which has needed practically no alteration. The first part of the Diploma falls into three groups: in the first, the students have to satisfy a Board consisting of the Principal and the two Deputy Directors that they know sufficient agriculture to continue their studies, while they also have to show that they have gained a sufficient number of marks given for diligence in their practical field classes. The second group comprises the major subjects of Agricultural Chemistry and Agricultural Botany, while the minor subject of Entomology and Mycology fall into the third group.

In the second part, half the total marks are allotted for agriculture; the other two subjects, Veterinary Science and Agricultural Engineering, share the remainder. In all subjects marks are allotted for class work, notebooks and attendance in varying proportion.

This year, the assistance of outside examiners was available in all subjects in the second part, and for Agricultural Chemistry and Agricultural Botany in the first part, as follows: Mr. McKerral, the Deputy Director of Agriculture, South Circle, Burma, in Agriculture; Mr. Aitchison, Principal, Veterinary College, Madras, for Veterinary Science; M. R. Ry. Rajagopal-sami Mudaliar, for Agricultural Engineering; Mr. Warth, Agricultural Chemist, Burma, for Agricultural Chemistry, and Mr. Southern, Deputy Director of Agriculture, Southern division, Trichinopoly, for Agricultural Botany.

Out of twelve students examined for the second part of the Diploma, ten passed and obtained their Diplomas, which were presented to them by the Acting Director of Agriculture, Mr. Stuart, on the 29th March. All the three College prizes, the Robertson prize, the Clogston prize and the Keas prize went to the same individual, a Mysore State stipendiary student, V. K. Badami, B. Ag. Of the second year, one student failed in Agriculture and another cannot continue his studies. One student, who has since resigned failed in Agricultural Chemistry. All the rest passed in all subjects and will be permitted to continue their third year studies.



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6. *Library*.—The library has received a good deal of attention during the year as the following figures will show.

One hundred and four new books were placed on the shelves, 88 obtained by purchase at a cost of Rs. 695, 15 supplied free, and 91 purchased by the Madras Mycologist and transferred by him to the library. Nine new periodicals were sanctioned for purchase by the Government and nine others were received for the first time as exchanges. The circulation of periodicals was maintained to the five outside gazetted officers of the department and the Board of Revenue and the Central Agricultural committee, over 1,100 issues having been thus sent out.

A large number of books, about 200, were bound in the college by the staff, but a proposal to employ a full time binder for this work was negatived, and a large consignment of books are now being bound by the Press at Ootacamund. The catalogue published last year is kept up to date as books are received, while the work of cataloguing the pamphlets and bulletins is proceeding. The collection of photographs was increased by over 200 negatives, most of them taken by the college staff. Many of these were made into lantern slides by the Librarian and will be available for teaching when the electric light installation is completed. The library staff also undertook the sale and distribution of calendars and leaflets.

7. *Students' Club*.—The club has had a successful year and finished free of debt. At cricket it defeated a fairly strong team of the Court of Wards, and in foot-ball it won several matches in a league started in Coimbatore for the first time this year. The physique of the students is good, but they cannot spare the time for sufficient practice to make really efficient teams. B. Dwarakanath won the Tennis cup outright with his third victory and we are now left without a trophy for tennis. K. M. Gura Raja won a medal for being the champion athlete.

M. R. By. M. R. Ramaswami Sivan continued Warden throughout the year. The mess was put under his official control and though there have been complaints, it has worked much more satisfactorily this year. It is not possible with the small number of students in residence to suit all tastes, but the appointment of a representative honorary committee among the staff, who pay visits from time to time, prevents any undue preference being given to a particular section. The shortage of water does not tend to lighten the Warden's duties. The good tone of the students is largely due to his influence, while the students have to thank him for the untiring care he displays in promoting their comfort and health. It is largely to his exertions, aided by others of the staff, that the Madras Agricultural Students' Union is in such a flourishing condition. This organization serves to keep up a connexion between past and present students of this and the Saidapet College, and furthers the cause of agriculture in a number of ways.

College Day.—The 7th July, the anniversary of the day when the College was opened by His Excellency Sir Arthur Lawley is made a time of reunion, and the various celebrations, sports, meetings and dinners are run under the auspices of the Union. The Hon'ble Mr. Butterworth, Commissioner of Agriculture, kindly presided at the sports this year and gave away the prizes.

8. *Sanitary*.—There are 91 houses with a population of 350 to be attended to and the work is done by a staff of ten toties working under the direction of the Sanitary Inspector. The latter officer has recently been directed in his rounds to keep an eye on the avenue trees, hedges and beds and has a few coolies working under him who attend to these.

Poudrette has been recently manufactured on a small scale and will be tested for the Farm crops.

The total number of births on the estate was 8, and of deaths 6 during the year.

9. *The Farm*.—The season has on the whole been favourable for both wet and dry crops. The average acre yield for paddy has been less by about 500 lb. than last year, which must have been an exceptionally favourable year. The experimental work, details of which will be found in the Scientific Report will be largely cut down next year, as it is not considered that with the staff and time available it is possible to ensure sufficient accuracy. More work will be done in the way of seed selection and testing. The College Farm will serve more and more as a training ground for newly-joined assistants and students, and less as an experimental and research station. In certain directions however, the practices adopted in the Farm are meeting with the approval of our neighbours, notably in the green manuring and planting of paddy, and the use of one or two implements, and there is little doubt, that, if staff permitted a good deal of useful district work could be done along these lines.

The use of the drill for sowing dry crops is generally adopted on the Farm, though it has not yet shown the superiority which was expected and which has been proved in other districts. The cotton drilling experiments this year have unfortunately failed from a very severe attack of stem borer.

During the year the Farm was visited by a representative of Messrs. Ransomes Sims & Joffries, the implement makers of Ipswich, who was engaged in studying Indian conditions and testing a number of ploughs which he had brought. The prospect of the introduction of a good iron plough is encouraging, if the right sort of plough is recommended from the start.

10. *Livestock*.—The number of livestock increased during the year by 41, 22 births and 27 purchases, while 3 animals died and 5 were sold. Some of the pure bred Kangayam cattle were sold to the Ceylon and Travancore Agricultural Departments, while recently Messrs. Ranga Raju & Brothers purchased one of the 'Baggiam' bulls.

The Dairy building is still awaiting completion by the Public Works Department. The Dairy has been separated from the Farm from the close of the year under report, and will be run as an entirely separate organisation and more or less on commercial lines. A fair herd of 51, including eight buffalo cows has been got together, but at present only their milk yield has been tested, so that their butter-making qualifications are unknown. It is of course not usual for a dairyman in this country to keep his own cows. Two excellent young buffalo bulls of a good milking strain were purchased during the year, and will be used when mature for improving the local buffalo. The Veterinary Assistant who has general charge of all the livestock, which at the close of the year were valued at nearly Rs. 12,700, has been much handicapped by the absence of a dispensary. This difficulty was partly obviated by giving him one of the rooms in the rest house, and allowing him the use of the stables for his sick beasts.

The number of animals brought from outside for treatment increases, and the number of cows brought for service is so large, that a small fee has recently been introduced.

The cross bred merino ram will soon have to be replaced as he is getting slack. During the year 15 lambs were dropped to him. Some of his former stock have been sold to the Pudukkottai Darbar, the best being kept to take the old ram's place.

The cowshed has been rebuilt and extended: the old structure being made use of as far as possible. Further extensions are contemplated, with a view to providing room for the increased number of cows and for the young stock. These are being built departmentally under the supervision of the Engineering Assistant, who has also had a good deal of work, supervising the repair and upkeep of the roads on the estate. The Robertson Road has been put in order and affords a pleasant private entrance to the estate from the south: heavy cart-traffic is not permitted on it. The Clogston Road has been lowered and widened. The Lawley Road has been thoroughly repaired.

The general appearance of the estate continues to improve. The avenue trees are in most cases growing satisfactorily, and small triangular beds made at the corners of the maidan have been planted and are doing well.

Considerable structural alterations were made to the well in field No. 6. The whole whote was raised 5 feet and a high level channel was built to supply water direct to the Botanical garden.

11. *Staff*.—M. R. By. D. Ananda Rao Garu, Probationary Assistant Director of Agriculture, Northern Division, was in charge of the Farm for the whole period. The work of Farm Manager entails long hours and very little spare time, and the actual practical experience which this officer has gained has benefited him greatly. The permanent Farm Manager, M. R. By. D. Balakrishnamurthi was set free to attend to the third year students and to undertake a little district touring: he takes over charge again on the Assistant Director's departure. The students of all classes are so far as this section is concerned, fortunate in having such teachers as the Principal's present assistants, Mr. D'Silva, M. R. Rys. R. V. Subrahmanya Aiyar and J. Chelvaranga Raju.

Assistant Farm Manager, Raghavachari relieved Assistant Farm Manager Raghavulu Nayudu at the end of November: the Farm clerk was changed in January. With these exceptions and except for varying periods of leave, all the executive staff remained unchanged throughout the year.

The Principal's Head Clerk rejoined duty after 1½ years' furlough.

M. R. By. J. Chelvaranga Raju and M. R. By. D. Balakrishna Murthi did a good deal of work in translating articles into Tamil and Telugu respectively for publication in the calendar and elsewhere, while the latter officer also wrote an illustrated article on the use of power mills for crushing cane, which was published in the Agricultural Journal of India.

12. *Accounts*.—The total expenditure during the year exclusive of salaries of gazetted officers, amounted to Rs. 32,909; this is higher than the previous year by about Rs. 3,000 and is accounted for mainly by the increased cost of feeding cattle, increased 'purchase of live and deadstock'—both capital charges and increased expenditure under 'repairs and upkeep'. The receipts were for the first time classified under various heads, in order to get some idea of the profit or loss from the different branches pursued: the total receipts were Rs. 20,270, Rs. 6,000 more than last year. This year also for the first time since the opening of the Farm a complete stock-taking and valuation has been made, and the following figures may be of interest. The livestock is valued at Rs. 12,760, implements at Rs. 7,000, and machinery and buildings (including Farm Roads) at Rs. 60,205. It should be possible with these figures, to make a correct estimate of the Farm's financial position.

COIMBATORE,
16th April 1912.

R. CREIL WOOD,
Principal.

THE ADMINISTRATION REPORTS OF THE AGRICULTURAL STATIONS
DURING THE YEAR 1911-1912.

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 an account of the district work connected therewith.

District work.—The work continues to increase rapidly and the possibilities of its increasing still more rapidly are now limited only by the staff available for this work.

During the year two Managers and three Assistant Managers were engaged solely in carrying on district work and at the same time a certain amount of district work was done by the Managers in charge of the farms, who whenever it was possible to leave the farms toured in the district. During the coming year one Manager and one Assistant Manager will be in charge of district work in Gōdāvari, one Manager in charge of demonstration work connected with the manuring of paddy in Kistna district, two Assistant Managers in charge of cotton work and general district work in Bellary district and one Assistant Manager in charge of district work in Chittoor and Cuddapah.

Cotton work.—During the year 44,115 lbs. of cotton seed were distributed from Bellary, Hagari and Nandyal Farms and from depots in Kurnool district, and 290 acres of seed farms were sown down with selected seed from the farms; 176 in Kurnool district and 114 in Bellary district. No seed was left unsold, the demand being greater than the supply. In Kurnool kappas of sarear cotton is being brought by dealers at Rs. 5 above the local rate, merely on account of its higher percentage of lint.

Next year 800 acres of seed farms will be sown in Kurnool district and 400 acres in Bellary district while distributing seed to the ryots opportunity is being taken to endeavour to persuade them to pick the kappas clean.

At present in the Ceded districts coolies do not turn out to work during the picking season till about 10 o'clock in the morning and they pick on right through the heat of the day and as they are paid according to weight of kappas picked, the work is done very carelessly, as much of the cotton plant as can conveniently be hidden away in the kappas being collected. To overcome this bad habit higher wages would have to be paid to the coolies for clean kappas and a difference in price would have to be made by dealers in favour of clean kappas. At present the petty dealer knows he can get as good a price for leafy cotton as for clean and naturally does not trouble to insist on the ryot producing only clean cotton for sale and he in his turn continues as before along the line of least resistance. Mere persuasion by the officers of the department will produce no effect; what is required is that exporting firms and spinning firms should insist on having clean kappas and lint from their dealers and should make a difference in price in favour of clean produce.

Assistant Farm Manager K. Narayana Aiyangar was in charge of the work in Kurnool until January when he was joined by Assistant Farm Manager Raghavulu Naidu and both were engaged in this work till the end of the year. At Bellary and Hagari the Managers in charge of the farm carried on the work, next year Farm Manager Ramaswami Pillai will be put in charge of this work in Bellary district.

Sugar cane.—Distribution of Seed.—The demand for canes this year was very small. B 208 becomes diseased quickly when grown in the delta and in consequence its distribution there will be stopped. It may however be useful in other parts of the Presidency. Altogether 1,998 canes were distributed during the year.

Improvements in cultivation.—Seventy-six ryots planted canes in rows-55 under the direct supervision of the Assistant Manager in charge of the work and the others of their own accord. The area so planted was 122 acres, but this does not represent the total area for the district as the practice is now beginning to spread.

Improvements in jaggery making.—No demonstrations were held this year, the available men who usually conducted these demonstrations being sent to South Arcot. No increase in adoption of this practice is noted.

Paddy.—One hundred and twenty-two ryots in Gōdāvari district sowed thin seed beds the area sown in this way being 20 acres, and 131 ryots transplanted single seedlings, the area so transplanted being 422 acres; this figure however does not represent the total area transplanted with single seedlings in the district, as this practice is also beginning to spread. The demonstration plot was continued at Nandyal but as yet has had very little effect on the practice of the neighbourhood though distinctly better crops have been obtained by this method. In Bellary district the lack of staff has not permitted of this practice being advocated to any great extent; a few plots were laid down at Hoepet and gave good results.

Assistant Farm Manager Ramaswami Aiyar was in charge of this work and the sugarcane work in Gōdāvari district, in the other districts the Managers in charge of the farms carried on this work.

Seed distribution.—14,558 lbs. of good paddy seed mostly konamani and rasangi were distributed in the main crop season of 1911-1912 and 1,705 lbs. all garika sannavari prior to the second-crop season. For the main crop season of 1912-1913, 21,600 lbs. have already been distributed.

Introduction of Cambodia cotton.—Altogether 2,560 lbs. of seed was distributed in this division mostly from Hagari and Nandyal farms. The crop has done well on the whole, though many ryots cultivated the crop rather carelessly. It has now gained a thorough footing in this division and the area devoted to its cultivation will increase rapidly.

In Sirvelank in Kurnool district 250 acres were put down under this crop and it is expected that next year this area will increase to nearly 1,000 acres.

Green manure.—The work of distributing green manure seeds has not hitherto assumed any considerable dimensions in this division, partly for lack of staff and partly because the practice of growing leguminous crops after the paddy crop is already in vogue in Gōdāvari and Kistna though the crop is not intended primarily for ploughing in for the benefit of the succeeding paddy crop.

Altogether 926 lbs. of green manure seeds were distributed from all the farms during the official year. At Samalkota 87 lbs. of Sesbania were distributed prior to the main crop season of 1911-1912. Seed distribution for the season 1912-1913 has just finished and 1,430 lbs. of Sesbania seed have been distributed.

Implement.—Attempts are still being made to introduce the black cotton soil plough in Kurnool district. The ryots there however view it with disfavour partly because of the number of cattle required to draw it and mainly because the cattle they employ are of the heavy Nellore breed, suitable enough for drawing heavy loads on an even surface but apt to suffer in their feet when they have to pick their way among the hard clods which fall into the furrow as the plough passes along.

General seed distribution details for each farm will be found in the administration reports.

The Bezvada Agricultural Station.

Proposals for giving up this farm were put forward during the year and were sanctioned before the close of the cropping season. As the staff was urgently required the crops were sold standing, the cattle sent to Samalkota to be disposed of, and the dead stock such of it as was of use transferred to other farms and the remainder disposed of locally.

Assistant Farm Manager Raman who was in charge of the farm at the time was transferred to Samalkota farm.

The Samalkota Agricultural Station.

Season.—The season was on the whole a fair one. The rainfall was normal in amount, though somewhat unevenly distributed. A few showers were received during the month of May and these helped to tide the sugarcane over this dry period and then a fall of dry weather which occurred in the middle of the south-west monsoon period was rather beneficial than otherwise for this crop, though it made necessary the irrigation of the dry paddies in the farm and materially decreased the yields from dry crops in the district.

Crops—Sugarcane.—This crop was planted in good time, though owing to the previous season having been rather a wet one the land was got ready with difficulty and it was not possible to sow the whole area to be planted. Growth was good both in the farm and in the nursery and though disease was found in both the former and the latter, the attack was not severe.

Two new canes Fiji B and Fiji C were received from the southern division and were grown along with the other varieties. Both grew fairly well but a few canes of latter was attacked by disease B 1529 and B 147. Both did very well this year and on ten cents. plots on the farm yielded at the rate of 21 and 23 candies* of raw sugar respectively though neither was as good as B 208 which from a similar plot yielded at the rate of 25 candies per acre.

The first named however gave the best analysis this year, the co-efficient of purity being 98.5 per cent.

The average acre-yield of raw sugar for the farm was 6,138 lbs. as against 5,175 lbs. of last year.

Paddy.—Regarding this crop there is very little to report. The crops on the whole were good though stunt was more in evidence than in last year, Ratnachudi being the most severely attacked. The average acre-yield for this year's main crop was 2,352 lbs. grain, for last year the yields were 2,109 lbs. grain for the main crop and 1,663 lbs. grain for the second crop.

Green manure crops.—*Sesbania*, *Pongapalu* (*Phaseolus mungo* var.) and sunhemp were grown as ante-monsoon crops to be ploughed in as manure for the succeeding paddy crops. The two first named gave excellent yields, the former yielding at the rate of 82,000 lbs. of green matter per acre and the latter at the rate of 14,000 lbs. per acre. Sunhemp failed.

Dry and other crops.—Turmeric, dry paddy, red gram, Cambodia cotton and maize were grown on the dry area. Turmeric grew very well and yielded an average acre-yield of 10,306 lbs. green weight as against 6,434 lbs. last year.

Dry paddy was adversely affected by the droughty conditions which prevailed in the middle of the monsoon and the yields are accordingly only moderate. Budama as usual gave the best yield 1,269 lbs. grain, 4,172 lbs. straw per acre. The average acre-yield for all the varieties was 911 lbs. grain as against 863 of last year. Red gram was grown as a mixed crop with dry paddy and yielded satisfactorily giving an acre-yield of 595 lbs. as against 748 lbs. last year. Cambodia was sown out in small plots at intervals during the season, in order to find out the best time to sow it. Pickings are still being made. Maize was a poor crop.

Experimental work.—The following additional experiments were laid down during the year:—

1. **To test the effect of an application of lime on paddy.**—Lime was applied last year to part of the sugarcane crop in field No. 18 and comparative plots limed and unlimed were laid out this year. The result show a better yield for the limed plot.

2. **To test the effect of drainage on paddy.**—Drains were dug all round a plot of paddy and after the crop was established water was run into the field and allowed to escape into the drain, the field was then left submerged as long as possible before a fresh supply of water was given. The crop was normal and only 19 waterings were required as against 24 given to the check plot.

3. **Ploughed and unploughed fallow.**—Two even plots were taken one of which was ploughed during the dry season and the other left unploughed. The after-treatment was alike. The object of this experiment is to test whether this stirring of the soil during the dry weather will lead to an increase of yield of paddy. The year's result are against ploughing.

As a result of the experimental work which has been done, it has been concluded—

1. That for sugarcane the addition of chemical manures to the ordinary application of castor cake is not beneficial.

2. That the adoption of a seed rate of 100 kanchams (700 lbs.) per acre for sowing paddy seed beds is wasteful and leads to a decrease in yield from the crop.

3. That transplanting paddy twice does not pay.

In accordance with these conclusions this manual series of sugarcane has therefore been given up and a series of manuals with different kinds of oil cake has been introduced, the 100 kanchams plot has been given up and one of 30 kanchams will be introduced and the experimental work to test the effect of twice transplanting will be discontinued.

Seed distribution.—The following quantities of seeds have been distributed during the year:—

Paddy—	Lbs.
Konsamani	10,658
Rasangi	1,320
Other varieties	2,579
Garika sannavari	1,705
Green manure seeds	165
Sugarcane	1,998
Miscellaneous	60

Staff.—Farm manager Muthusami Aiyar remained in charge of the farm throughout the year. Assistant farm manager Sitaramaswami Naidu was on leave till October 10th from which date he continued till the end of the year. Assistant Farm Manager V. S. Ramaswami Aiyar took charge of the district work from the beginning of the year and continued in charge throughout. Assistant Farm Manager Raman was transferred to this farm from Bezvada in February and continued till the end of the year.

The Hagari Agricultural Station.

Season.—The season was unfavourable more particularly for food crops than for cotton, though better here than at Bellary where the rainfall was less by two inches than that recorded for this farm.

The early rains failed and in consequence the early crops "korra" (*Setaria italica*) and "sazza" (*Pennisetum typhoidum*) were sown a month late and did very badly.

The short rainfall also necessitated more frequent waterings being given to the garden crops and considerably added to the expense of cultivation.

Crops.—(a) **Early.**—As stated above the yields were poor. Korra as a mixed crop with cotton gave an average acre-yield of only 107 lbs. grain and 190 lbs. straw and as a pure crop of 158 lbs. grain and 497 lbs. straw, the yields last year being respectively 358 lbs. of grain and

368 lbs. of straw and 365 lbs. grain and 383 lbs. straw. Sazza in field No. 11 did a little better than korra but in field No. 9 practically failed. The average acre-yield for the year was 260 lbs. of grain and 810 lbs. of straw considerably less than last year when the average acre-yield was 443 lbs. of grain and 1,058 lbs. of straw.

(b) **Late—Cotton.**—Considering the shortage of rain this year the yields obtained from this crop, grown as a pure crop are distinctly good, the average acre-yield of kappas being 367 lbs. as against 286 lbs. of last year. As a mixed crop with korra however it practically failed yielding only 77½ lbs. of kappas per acre, a miserable return compared with the average for last year which was 212 lbs. per acre.

Sorghum.—As far as the yield of grain is concerned this crop failed, the yield of straw is however fair. In some of the fields no grain at all was obtained and in the others only plants favoured either by being at the border of the field or in a lower lying piece of ground matured grain. The average acre-yield was 25 lbs. of grain, 700 lbs. of dry fodder and 294 lbs. of green fodder which was fed to the cattle before the crop was harvested. Last year the average acre-yield was 405 lbs. of grain, 600 lbs. of dry fodder and 220 lbs. of green fodder.

Garden.—As regards this area there is as yet very little to report. The crops this year were only fair and most of them have yielded some profit though the expenses of cultivation were heavier than they would be in an average year. Cambodia cotton has done the best in this respect a plot of 40 cents yielding at the rate of 900 lbs. of kappas for the first picking. The second picking is still in progress. Red Mauritius sugar-cane brought from Samalkot last year was not a success being badly attacked by stem-borer. It is being tried again.

Experimental work.—On the black cotton soil area the experiments already laid down were maintained and selection work in cotton and sorghum was continued. Sufficiently large quantities of lint of selected cottons Nos. 1, 2 and 3 were obtained from the 1910-1911 crop to enable a spinning test to be made. Messrs. Binny & Co., Mt. Ras, who were good enough to carry this out for us reported Nos. 1 and 2 to be practically equal and better than 3 and seed of these two types was accordingly sown out on seed farms to obtain as much seed as possible for distribution, 114½ acres altogether, partly on the farm and partly outside being sown in this way.

As regards sorghum the bad season made it impossible to arrive at any definite conclusions as to the merits of the different strains sown.

In the garden experiments have been laid down in the sandy area to test the effect of an application of (1) silt alone, (2) the local pati-mannu alone, and (3) Superphosphate after giving a dressing of lime and ploughing in a green-manure crop. Ridge planting of onions and ragi as compared with planting on the flat bed is also being tried and selection work in maize, ragi and chillies has been begun.

Distribution of seed.—The total quantity of seed distributed was as follows:—

Local cotton	6,308 pounds.
Cambodia cotton	1,267 "
Green-manure seeds	371 "
Miscellaneous	172 "
Sugar-cane	100 canes.

Practically all the local cotton seed was distributed to neighbouring villages, the equivalent acreage being 250. Of the Cambodia seed distributed 1,160 lbs. was taken by ryots in the three taluks of Bellary, Rayadrug and Gooty, the remainder going to other parts of the Northern division.

Staff.—Farm Manager Ramasami Pillai remained in charge of the farm throughout the year. Assistant Farm Manager Raghavachari was posted to this farm and remained for one month until the 4th May 1911 when he was removed and his place was filled by Farm Manager Rajagopalachari who continued till the end of the year.

The Bellary Agricultural Station.

Season.—The season was a poor one. The early south-west monsoon rains were not sufficiently heavy to permit of early crops being sown, and the total rainfall was not great enough to afford sufficient moisture for the proper maturing of the main crops.

2. **Crops—Maize.**—The yields were very poor, the acre average yield for sorghum for the whole farm being 43 lbs. of grain and 1,090 lbs. of straw, while the best yield of grain (534 lbs. per acre) was obtained from the no-manure plot in the permanent cotton manurials and of straw (8,800 lbs. per acre) from the superphosphate plot in the same series. Cotton as a pure crop averaged 137 lbs. per acre and as a mixed crop only 24 lbs. per acre.

3. **Experimental work.**—The permanent cotton manurial and the permanent rotation manurial plots were both cropped with sorghum this year. The results of the latter have been summarized and the conclusion arrived at is, that for dry cultivation on the black-cotton soils of this district chemical manures such as salt-petre and superphosphate are of little benefit and that

organic manures are of distinct benefit, their use leading to an increased yield of both grain and straw. The results also point to the conclusion that of the organic manures used, viz., box manure, pit manure, heap manure and safflower cake, the first named is the best.

As this farm is unsuitable for experimental work, proposals have been put forward to give it up. In the meantime until its fate is decided the farm will be worked from Hagari and will be used to produce seed for distribution.

4. *Staff.*—Assistant Farm Manager W. Raghavachari was in charge of the farm until 3rd April 1911 when Assistant Farm Manager V. S. Subramania Sastri took charge in which he continued until the end of the year.

The Nandyal Agricultural Station.

Season.—The season was favourable for cotton and fair for sorghum and on the whole better than last year though the rain fall for the year was only half that recorded for last year. Sorghum grew very well until the middle of October and had there been a fall of two inches towards the end of that month, it would have yielded satisfactorily and there would have been very little in the season to complain of.

Crops—Sorghum.—This crop was sown out over an extent of 11½ acres this year and as stated above the yields were fair, better than last year when the rains were untimely and in excess of the requirements of the crop, the average acre-yield this year being 420 lbs. grain and 1,920 lbs. of straw as against last year's yield of 247 lbs. of grain and 1,113 lbs. of straw.

Selection work in this crop has been begun but as yet there is nothing to report.

Cotton.—18.75 acres were put down under this crop this year of which one acre was grown as a mixed crop with horsegram. The yields are satisfactory the best being obtained from selection No. 50 which on a 15 cents plot yielded at the rate of 470 lbs. of kappas per acre. Sircar cotton in field No. 2-A on a plot of 5 acres gave an average yield of 456 lbs. of kappas per acre, this field is however the best on the farm. Selection work in this crop continues to make satisfactory progress. Samples of lint of Nos. 2, 3 and Sircar cotton were sent to Messrs. Binny & Co., Madras, who kindly tested them and reported that No. 2 was the best. As this cotton had shown itself to be the best of the selections on the farm, in point of colour and percentage (the figure this year was 31.4) it was sown out on a large plot preparatory to being distributed to the seed farms and next year 1912-1913, 100 acres will be sown with this selection and will provide a small amount for distribution in addition to sowing out the whole area required for seed farms in 1913-1914. The average acre-yield of kappas this year was 308 lbs. as against 214 lbs. last year.

Experimental work.—All the experimental plots were maintained and in addition a manurial experiment with cattle manure was laid down.

Seed distribution.—The following quantities of seed were distributed during the year :—

	lbs.
Local cotton	34,000
Cambodia cotton	2,000
Green-manure seeds	315
Miscellaneous	1,831

Twenty-four implements mostly seed drills were supplied to applicants.

Miscellaneous.—Proposals were made to extend the farm, and these were sanctioned and an area of 45.48 acres was taken over on the southern side of the farm.

Staff.—Assistant Farm Manager T. S. Venkatarama Aiyar remained in charge of the farm throughout the year.

The Hindupur Agave Plantation.

The proposals put up in 1910-1911 to give up the plantation were sanctioned in G.O. No. 965 of the 3rd April 1911, and therefore no work was carried out during the year. The watchman was retained until October 31st, 1911 and the plantation was handed over to the Revenue Department in November 1911.

15th May 1912.

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 reports of the agricultural stations under my charge for 1911-1912. The district work in connection with each agricultural station is also mentioned in these reports.

2. I took charge of the southern division from Mr. Sampson on the 22nd of April 1911 and with the exception of two days which were spent on casual leave, have been in charge for the remainder of the year under report.

3. During the year the work of the department has developed considerably and instances are not wanting to show that, as it becomes more widely known, it is being made use of more and more by the cultivating classes. The increase in the correspondence in my office, in the number of visitors to the agricultural stations, in the sale of seeds, all point to the fact that the department is appreciated and is extending its sphere of usefulness.

4. Six thousand five hundred and ninety-seven copies of the agricultural calendar were sold through my office during the year. The quantity of correspondence and orders for seed, which they bring in, show their value as a means of bringing to the notice of the ryot any crops, implements, improvements, etc., the value of which has been proved on the agricultural stations.

5. I was able to spend 185 days on tour during the year and besides visiting the agricultural stations and Coimbatore, was able to make district tours in the Tanjore delta, the Cauvery valley, the irrigated area of the Madurai district, the black cotton soil tract in Tinnevely and the Tambraparni valley. I also visited the farms in the Northern division. The Assistant Director, M. R. Ry. Ramasastrulu Nayudu, spent 150 days on tour during the year: much of his time was taken up in visiting the lands of private individuals in response to letters asking for advice. In this way he was able to traverse most of the division, besides which he also visited the agricultural stations from time to time.

6. Separate reports will be submitted on the cotton improvement and green-manuring work, both of which have made satisfactory progress. The area under drilled crops in Tinnevely district this year, namely 3,605.40 acres, is greater than it has ever been before. The demand for pure karunganni seed from the seed farms was very great. The whole quantity, 94,968½ lbs. was all disposed of very early in the season and many people who came later for seed were disappointed. The demand for pure Cambodia seed was also very large and 30,520 lbs. were sold during the year.

The receipts from the sale of green-manure seeds this year amount to Rs. 4,624-14-4 as compared with Rs. 3,680-11-8 last year.

The Palur Agricultural Station.

The Season.—The rainfall of 48.64 inches is well above the average of 44.76 inches for the last five years. During the south-west monsoon there was a long break in the rains just after dry land sowings had been completed with the result that dry land crops fared very badly. The north-east monsoon however, though rather too violent at the end of November, produced some excellent paddy crops, but proved too much for the sugarcane crop which it was impossible to drain.

Rainfed crops.—As already mentioned, the rainfed crops suffered this year from a long period of drought just after sowing. The Transvaal varieties of cumbu, the fodder cholam and the introduced varieties of maize practically failed in consequence. The cereal-ground-nut rotation experiments have however given interesting results though the cereal crops have all been poor. The advantage of growing the cereal and ground-nut crops mixed every year rather than as pure crops in alternate years has been very clearly brought out by this year of short rainfall, when cereal crops practically failed. A comparison of the results obtained during the last five years show that cumbu and ground-nut every year has given better results than tenai and ground-nut, while the plots where cumbu and tenai are grown in alternate years have given the best results of all.

Crops on garden land.—In spite of the failure of the April and May rains, the irrigated ground-nut crop was good, though the irrigation charges were heavy. Some of the varieties, now that they are becoming acclimatised, are yielding heavier crops; and the variety from Senegal has this year given a higher yield than the local Mauritius variety. Cambodia cotton, as a rotation crop for irrigated ground-nuts, last year gave a profit of Rs. 150 per acre. This year ground-nuts were grown on the same land and gave a yield of 1,754 lbs. per acre which is the highest yield obtained on the farm this year. All the seed from the cotton crop was disposed of locally for seed purposes. Several very successful crops of Cambodia cotton were grown in the neighbourhood of the farm this year and the cultivation of the crop is rapidly spreading northward into Villupuram and Tiruvannam taluks. The three taluks to the west of the farm, Tirukkōyilur, Kallakurichi and Vriddhaachalam were also visited this year by officers from Palur, leaflets on the cultivation of Cambodia cotton were distributed and orders for seed, which was supplied later from Kailpatti, were booked. It is not known yet how the crops are succeeding as it has been impossible to spare any one to visit them.

Crops on the wet land.—The sugarcane crop was this year on low-lying land which was water-logged during the north-east monsoon with the result that the crop made very little growth after November. Java seedling No. 247 is a promising variety which tillers very well and stands up even on water-logged land. Tauna blanche, though not a very high quality cane, yielded a heavy crop and is being distributed by the factory at Nellikuppam to neighbouring ryots. The area under cane this coming year is expected to be over 3,000 acres and the factory will have to enlarge their plant to deal with the increase in production. Ryots in the neighbourhood are now beginning to understand the importance of drainage to the

sugarcane crop and there were many crops this year grown on garden land under well irrigation. There were two oil-engines at work close to the farm, each irrigating about 10 acres of cane: the crops grew very tall and were expected to yield from 20 to 25 candies (of 500 lbs.) of jaggery to the acre. The factory also grew some very good crops on garden land and find that on this kind of land the crops ripen well and do not lodge as the drainage is good.

The paddy crops this year have been very good and the marked improvement in the fertility of the farm wet lands during the last few years may be seen from the following figures which give the total yields of paddy obtained on the farm during the past five years:—

Year.	Total yield in lbs.
1907-1908	21,852
1908-1909	25,760
1909-1910	25,053
1910-1911	38,528
1911-1912	40,030

The increased fertility is due to the practice of growing green-manuring crops and is not the result of expensive manures which are not within the reach of the ryot. Several instances have been given in the scientific report of this station showing the increase in yield of paddy crops produced by the green-manuring crops and there is nothing further to add to the remarks made there. As will be seen from the seed distribution statement of this farm for the year, a very large quantity of seeds of green-manuring crops have been sold and it seems likely that in the next few years the practice of green-manuring paddy lands will come into vogue largely in South Arcot district where the water-supply is good.

Seed distribution.—The total quantity of seed distributed from the farm during the year is as follows:—

	LBS.
Paddy varieties	13,960
Ground-nuts	2,888
Green-manure seeds	26,429
Cambodia cotton seeds	645
Maize seed	74
Onion seed	72
Cane setts	50,422

Staff.—The Manager spent 65 days in camp during the year in addition to which he was transferred to Manganallur Agricultural station for three months from the middle of November to the end of February to commence building operations prior to the return of Farm Manager M.R.Ry. C. Narayana Aiyar who did not return from sick leave till the end of February. The Manager toured in Shiyali taluk in May in connection with the introduction of green-manure crops and single planting of paddy. He also attended two meetings of the Kallakurichi Branch Agricultural association and sold a considerable quantity of green-manure seeds in this taluk. Assistant Manager K. Ramanatha Aiyar continued his green-manuring work in North Arcot district which was begun last year; he also toured in some taluks in South Arcot district with the same object. Assistant Manager N. S. Kolaudaisawmi Pillai toured in Tirukkoyilur, Kallakurichi, Vriddhachalam and Attur taluks in connection with the extension of Cambodia cotton cultivation; he distributed leaflets and sold 2,270 lbs. of Cambodia cotton seed while on tour. During July and August he was transferred temporarily to work in the Periyar tract. Assistant Manager K. T. Alwa joined the department on 16th January 1912 and has since been stationed here.

Miscellaneous.—The following implements were made and sold by the farm to ryots during the year:—

Scind ploughs	52
Triangular harrows	25
Improved country ploughs	13
Guntakas	4

Scind ploughs are increasing in popularity in this district for dry lands and garden lands. The deeper tillage effected by this plough has produced better crops this dry season than were obtained on land ploughed with the country plough.

The rest-house for Indian visitors was completed during the year and is now in use. One bullock died from Tetanus during the year and another was purchased to take its place.

The Koilpath Agricultural Station.

Season.—The total rainfall of 30.76 inches during the year has been much above the 35 years' average of 25.79 inches: as was the case last year, however, the rain has been badly distributed. In the beginning of the year the hot weather rains gave promise of producing a second flush of cotton, but, just when the plants were flowering, heavy rain fell which caused the flowers to drop without setting bolls. The second picking was therefore practically a failure.

The red soil crops were sown in September, the usual sowing month, after which there was a dry period of a fortnight during which the newly-sown crops were threatened with drought. However, the north-east monsoon rains came in the second week of October and continued with very few interruptions till the middle of December. In the months of October to December the rainfall was more than was necessary and was so continuous that sowings and inter-tillage were much interrupted, while the growth of the cotton crop was checked. The fodder cholam crops, however, benefitted very much from the rainy weather and throughout the district were excellent. Cumbu was not seriously damaged by the rain which had almost stopped when the crop came into flower. During the last three months of the year only half an inch of rain fell, while the 35 years' average for this period is 2.31 inches. The cotton crop has accordingly suffered and will yield little more than a pothie per acre which at the present low prices makes profits very small.

Black soil crops.—The success of drilled cumbu crops has been very clearly shown this year and all over the district they have given better yields than broad-casted crops. It is difficult to account for this fact and it might be expected that in a rainy season like the present there would be little difference between the two methods of sowing, especially as it was impossible in many cases to get the implements on to the land to intertill the crops. Selection work has this year been commenced on the local variety of cumbu and for this purpose fresh seed was obtained from Ottappidaram taluk, a tract of cumbu-growing country where a very good strain of cumbu is grown. The crop from this seed was superior to the farm cumbu and some selections have been made from it for sowing next year. As already stated, the fodder cholam crops were very good this year. The periamanjali variety which was introduced two years ago from Coimbatore has given very heavy yields of fodder and shows promise of being an improvement on the local irungu variety especially on garden lands.

Improvements.—The revetment work has this year continued on the black soil and though there is still more to be done in some fields, the heavy rains this year drained away much more quickly and did not do so much damage as in former years. During the year the implement shed and office were completed and two new coolie huts were built on the black soil. The Public Works Department also handed over the inspection bungalow to this department.

Staff.—The agricultural station suffered considerably this year from too frequent changes in the management. On 1st June 1911, Farm Manager M.R.Ry. A. V. Tirumuruganatham Pillai was transferred to Madura to take charge of the work in the Periyar tract when M.R.Ry. C. Narayana Aiyar's health broke down. M.R.Ry. M. Magesha Rao then managed the farm until he was transferred to Taliparamba Agricultural station for two months during which time acting Manager Sankara Aiyar was in charge. These repeated changes interfered with the district work also.

Seed distribution.—During the year 12,920 lbs. of kolinji and 31,152 lbs. of Cambodia cotton seed were distributed from the farm. As all this seed had to be carefully dressed before being sent out, a great deal of the officer's time was taken up with this work. In addition to this, cumbu, cholam, onion, maize, cowpeas, coriander and other seeds were sold in small quantities.

Miscellaneous.—As the result of a cyclone on the 17th of September, the cattle shed and coolie huts on the black soil area were blown down and two bullocks were killed.

The Taliparamba Agricultural Station.

Season.—The season was on the whole favourable for the paddy and sugarcane crops, but unfavourable for the pepper and dry land crops generally. The June rainfall of 61.24 inches is the heaviest on record since 1905. At the beginning of June the monsoon broke with great violence and as a result, the paddy nurseries which were sown late on account of the failure of the hot weather rains, suffered; the heavy floods also checked the growth of the young sugarcane crop. At the commencement of the north-east monsoon there was not sufficient rain for dry land crops, while towards the end there were one or two very heavy falls which caused a great loss of pepper from shedding of spikes and "pollu" attack.

Crops.—The work has this year been chiefly confined to the following crops:—Sugarcane, paddy, pepper and dry land crops generally.

Sugarcane.—Of the varieties under trial on the farm, Barbados seedling No. 208 has given the best results and seems in every way suited to West Coast conditions. The cane grows strongly and stands up well: in addition to which it ripens well and makes excellent hard jaggery. The greatest point in its favour, however, lies in the fact that the canes do not arrow at the end of the monsoon. All the other varieties which have been under trial this year came into flower and stopped growing as the monsoon disappeared.

The red Mauritius cane which was originally distributed on the West Coast does not ripen so uniformly and consequently gives softer jaggery than the B/208 variety which is gradually replacing it.

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Paddy.—The farm crop this year demonstrated clearly the improvement in yield that can be brought about by seed selection, single planting and the growing of green-maturing crops. The farm crop was all transplanted with single seedlings from selected seed. The nursery was thinly sown in consequence of which all the young plants were strong and healthy when transplanted. Daincha and cowgram were both grown as green-manure crops but did not give as good a crop as was expected owing to the failure of the April-May rains. The superiority of the farm paddy both in size of grain and yielding capacity over the local crops is so marked that there is a large demand for the farm seed and the whole of the crop was disposed of locally for seed purposes. Forty-six Madras measures of Daincha seed were disposed of for green-maturing purposes partly in the neighbourhood of the farm and partly by the Manager and Assistant Manager when on tour in connection with sugarcane work. It is at present, however, too early to report on the growth of the crops.

Pepper.—But for the unfavourable weather at the end of the north-east monsoon the pepper crop would have been a very heavy one. Under the circumstances therefore this year's yield of 3,654 Madras measures is satisfactory and is the highest on record with the exception of the 1910 crop. The yields from the non-experimental portion of the garden show a great improvement during the last few years and demonstrate the importance of paying proper attention to the vines and digging the garden regularly. The young vines planted since 1906 are growing well and beginning to bear. Of the plots under experimental treatment the plot manured with lime and leaf-mould has increased in yield every year from 575 Madras measures in 1907 to 113·5 Madras measures this year. The vines in this plot also feel the hot weather and wilt much less than vines in other plots. Lime and leaf-mould is a cheap manure and now that its value has been proved, its use will be advocated. Of the other manures under trial, fish manure and cattle manure have given the best results.

Dry land crops.—The object of the dry land portion of the farm as explained last year is to demonstrate that permanent cultivation of dry land is more remunerative than the destructive practice of fugitive cultivation. The experiment was started in 1907 and so far the results have been successful. Our example has been followed and in the neighbourhood of the farm there are now several walled gardens to be seen similar to the dry land portion of the farm. The most successful of the crops which have been introduced is ginger. This year half an acre of land was planted with ginger and in spite of the somewhat unfavourable season, the enormous net profit of Rs. 221-8-0 was obtained from the half acre. In the neighbourhood of the farm the cultivation of the crop is being eagerly taken up and it is impossible to meet the demand for seed. The chilly crop also gave a net profit of Rs. 57 per acre, but this would have been more than doubled had there not been a spell of drought at the beginning of the north east monsoon. The ground-nut crop which gave so much promise when it was first introduced suffered very much this year from wild animal attack; this was also the case last year and in consequence many people have given up the crop. In certain parts of South Malabar, however, the crop has established itself and in Palghat an 8 horse-power oil-engine has been started for milling the nuts.

Staff.—The Manager has been in camp for 175 days and the Assistant Manager for 84 days during the year. Farm Manager M.R. Ry. M. Mangusha Rao was temporarily transferred from Koilpatti to take charge of the farm during the sugarcane-planting season from 3rd January 1912 to 29th February 1912 when both the Manager and Assistant Manager were in camp. Assistant Manager K. P. Sundaram Aiyar joined the department on 5th May 1911 and was stationed here till 20th June 1911, when he was transferred to the Tanjore delta. Now that the work of the department is becoming known, the touring work is very much heavier than it formerly was and the present staff of a Manager and an Assistant Manager is inadequate to deal both with district and farm work. In view of the fact that sugarcane promises to be such a successful crop, it seems advisable that a full-time Manager should be stationed on the West Coast during the next few years to supervise the cultivation of the crops and the making of jaggery which are unknown to West Coast people.

Visitors.—The farm is well known now throughout the West Coast and this year there have been a large number of visitors. Some very successful parties organised by the Tahsildars have visited the farm and been shown the work which is being done. In this way the influential ryots of seven taluks visited the farm with the Tahsildars. All the visitors were much struck with sugarcane crop and many orders were received for seed canes. The ginger and chilly crops also attracted much attention. The Manager and Assistant Manager are to be congratulated on their year's work.

Items.	Receipts.	Items.	Charges.
	Rs. A. P.		Rs. A. P.
Sale of pepper ..	1,104 2 2	Purchase of live stock ..	15 4 0
Do. of ginger ..	137 7 3	Do. of dead stock ..	88 8 4
Do. of jaddy ..	104 11 4	New work ..	174 13 9
Do. of sugarcane ..	26 13 10	Repairs and upkeep ..	181 12 4
Do. of jaggery ..	107 11 2	Maintenance of cattle ..	75 0 11
Miscellaneous receipts ..	221 6 1	Cooly labour ..	486 13 1
		Miscellaneous cultivation expenses ..	143 8 0
		Seeds and plants ..	16 4 7
		Manures and chemicals ..	144 9 6
		Stundries ..	13 14 9
Total ..	1,702 3 10	Total ..	1,569 9 3
Net profit ..	172 10 7		

* This excludes Rs. 23-11-6, value of seed supplied free.

H. SOUTHERN,
Ag. Dy. Director of Agriculture.

APPENDIX III.

ANNUAL REPORT OF THE MADRAS AGRICULTURAL CHEMIST
FOR THE YEAR 1911-1912.

I have the honour to submit herewith my annual report for the year ending March 31st, 1912.

2. Several changes have been made in the constitution of the staff during the year. After several ineffectual attempts to fill up the vacant post on Rs. 150—20—250 *per mensem* the Government sanctioned, in G.O. No. 2137, dated the 13th July 1911, the splitting of it up into

two posts of lesser pay, and M.R.Ry. P. A. Raghunathaswami Aiyangar, a Diplomat of the Saidapet College, was appointed as assistant on probation on grade Rs. 50—10—150 on 1st October 1911. M.R.Ry. B. Visvanath was appointed on probation to the remaining post of Rs. 50—10—100 on the 20th January 1912. Owing to this accession to the number of assistants the Second Assistant, M.R.Ry. P. A. Subramanya Aiyar, B.A., was relieved from the routine analytical work and was delegated on 1st October 1911 to carry on research work under my directions. It is hoped that this arrangement will lead in the future to the production of larger volume of this type of work than hitherto has been found possible.

3. During the year the following samples have been examined and reported upon—

Feeding stuffs and fodders	29
Soils	71
Well and irrigation waters	38
Sugarcane and sugarcane products	179
Alkaline soils	4
Oils and oil-seeds	46
Poonacs	4
Pati mannu	9
Fish-manure	6
Village and farm-yard manure	14
Artificial manures	8
Miscellaneous manures	22
Total	430

This is an increase of 105 samples as compared with last year and is mainly due to the larger amount of analytical work done in connection with sugarcane. The work in this direction was hampered by the fact that the additional polariscope indented for did not arrive until towards the end of the sugarcane harvest, otherwise there would have been a still greater increase in the number of analyses performed.

The number of analyses performed for persons outside the department was 103 and these consisted mainly of samples of soil and irrigation waters.

4. The work upon the black-cotton soils of India has been concluded for the present and an article is in the course of preparation for publication. This investigation was carried out in conjunction with my Chief Assistant M.R.Ry. M. R. Ramaswami Sivan Avargal, B.A.

5. The work in connection with the gases actually found in the paddy soils has been concluded, but it has been decided not to publish them at present as the problem is complicated by the fact that the gases actually evolved from the soil are different in composition and appear to have a connection with the aeration of the roots. The whole problem is closely bound up with the question of drainage in these soils, and the amount of water necessary for the crop, and pot-culture experiments have been carried out, the object of which is to gain definite information on the subject. These experiments will be proceeded with during the ensuing year.

6. Bacteriological work dealing with the decomposition of green-manures in paddy soils and other problems of a like character, have been carried out and the investigation is still proceeding.

7. The flying survey of the Kistna delta has been completed and it is proposed, during the ensuing year, to carry out a more detailed type of survey of the soils of the Tanjore delta.

8. Many analyses have been carried out relating to the composition of the crops of South India and this will be continued as opportunity arises.

9. During the year the Agricultural Chemist was on tour for 31 days and the members of his staff for 92 days.

COIMBATORE,
14th April 1912.

W. H. HARRISON,
Agricultural Chemist.

APPENDIX IV.

ANNUAL REPORT OF THE GOVERNMENT BOTANIST, 1911-1912.

I have the honour to forward the following report on the work done in my section during the year 1911-12.

2. *General*.—While the laboratories are now fairly well equipped, the furnishing is by no means complete. This is especially the case with the herbarium, where the new cases have not yet been supplied, and the lecture room which is still untouched. Work in all directions was continued uninterruptedly during the year.

3. *Staff, leave, etc.*—The Government Botanist was in charge throughout the year. The Head Clerk was on sick leave for six months and various other officers enjoyed short periods of privilege leave. Fieldman K. Chinnaswami Pillai was suspended in December for one year for insubordination.

4. *Government Botanist*.—During the first part of the year teaching, as usual, occupied most of the Government Botanist's time. Upon his being relieved of elementary teaching by the Board, however, he was able to devote himself to a certain amount of touring and research, as detailed below. During two periods aggregating 41 days he was in charge of the Principal's office as well as his own while that officer was on tour with the students. Sixty-four days were spent on tour. Bangalore, Taliparamba, Madras, Ootacamund, Iruttupallam and Coorg were visited as well as the Agricultural Conference at Pusa. Among special reports prepared the most important was one on the spread of *Mimosa pudica*, the sensitive plant, in Coorg. This report has now been printed in the Agricultural Journal of India. A considerable amount of time was spent in the herbarium as stated below.

Two courses of lectures were delivered, one in Elementary Botany, chiefly by an Assistant, and one on Agricultural Botany by the Government Botanist. These lectures are referred to in the report on the working of the College.

5. *Systematic Botany*.—A considerable amount of attention was devoted to this section during the year because of the decision on the part of the Government to have a flora of Madras Presidency prepared, and numerous reports were forwarded on the subject. There was practically no special touring for the collection of plants, but substantial additions were made to the collections of peppers and *Loranthaceae* by the Government Botanist while on other tours and a few local expeditions were made by fieldmen.

Much progress was made in getting the large accumulation of plants, collected in previous years by the Government Botanist, named, although this work was still hampered by lack of staff and the absence of suitable herbarium cases. Some 7,700 sheets were finally written on and added to the special collection of Madras plants. Eighty duplicate sheets were received from the Calcutta herbarium. A small herbarium of 250 species of plants was given to the Presidency College for teaching purposes and about 50 sheets were distributed to other correspondents. The whole collection of *Dioscoreas* was sent to the Reporter on Economic Products and named and returned by him. The valuable collection of *Grewias* remained with the Kew authorities throughout the year. An important addition was made to the illustrations of the Madras flora in the form of 513 pen and pencil drawings of plants. On investigation these turned out to be the originals of the plates in Wight's, Beddome's and other authors' published works on the Madras flora. They were received in an extremely dilapidated condition but every effort is being made to preserve them in a series of specially prepared atlases. About 200 plants were named by the Assistant for various correspondents. The collection of 1,143 sheets of Madras peppers was overhauled by the Government Botanist and numerous dissections and drawings made. The specimens were sorted, arranged and named where possible and notes were drawn up for the information of the writer of the flora. A summary note on this work was prepared and forwarded for filing at Kew. The seed collection was overhauled and it was found necessary to reject a large number on the ground of insufficient naming. About 250 new species were however added so that the number at the end of the year was 600.

Numerous notes and reports were prepared during the year, the following being most important:—

Todalia aculeata and *Erythroxylon coca* for the Separate Revenue Department, the cultivation of coca and drought-resisting Fodder Plants for the Director of Agriculture, Tropical Eucalypts for the Kistna Agricultural Association, Arechids on the Nilgiris for Mr. Atanui, Australian timber trees for the Engineering Department, etc. A short article was prepared on the Chingleput flora for the officer compiling the Gazetteer.

6. *Economic Botany*.—The work in this section varied a good deal at different periods, partly according to the plants growing and also partly to the amount of time available from teaching work.

Cotton.—In the early part of the year careful analyses were made of the seed and lint characters of the second generation of crosses raised in the botanical garden, this study involving the thorough examination of some 400 plants. An interim crop was raised in baskets and then planted out, but of the 900 plants thus treated most failed to mature, owing to a severe outbreak of stem-weevil and the unseasonableness of the weather. Mendelian work on them was therefore impossible. The main crop was then sown at the usual time but here again the growth was so poor that the study had to be abandoned. Considering the disastrous effect of the stem-weevil upon Cambodia plants grown in the neighbourhood of Coimbatore it is of interest to record that the Spence plants grown in the Botanic garden appear to be more or less immune to this pest. Further, a cross between Spence and Bourbon raised in the garden has the same character and was able to overcome the attacks of stem-weevil while the Bourbon, like the Cambodia, succumbed. It is worth while considering whether an infusion of Spence blood into the ordinary Cambodia may not be of use if the latter variety continues to be seriously threatened by this new pest.

Some dark brown-coloured Cambodia kappas received from Tiruppur was sown with the main crop after analysis. Although the plants suffered much as the other cotton plants there is sufficient evidence to make it certain that this form is a cross and not a natural sport as at first seemed probable.

Some interesting hybrids having been observed among the exotic cottons grown at Palur Farm an assistant was sent down to examine them. From his study it appears that the parents of the crosses were Sea Island and Cambodia. The necessary instructions were drafted or the collection of seed and the further examination of these interesting plants.

Some further desultory work was done in cottons for various correspondents and the root systems of Uppam and Cambodia were dissected out and photographed.

Hibiscus Cannabinus (Gogu).—Six forms obtained by previous Mendelian work, including the red-entire-leaved form which had been built up in the botanic garden, were planted out for testing the yield and quality of the fibre. Like other plants sown however the growth was very poor and the work will have to be done again for a satisfactory test. A set of plots were sown for the use of the students and formed one of the practical illustrations in the course on Mendelism.

Red-grain (*Cajanus indicus*).—The farm varieties separated in previous years were again sown and analysed, special reference being made to yield, age of maturing, cooking and tasting qualities. Selected seed was reserved for next year's sowing.

Colour estimation.—Owing to the importance of correct estimation of shades of colour in Mendelian work a careful study involving hundreds of observations was made of the tintometer lent by the Agricultural Chemist.

Sugarcane.—After the Pusa Conference and commencing with the Christmas holidays, all spare time was devoted to this subject. Two main lines were studied, the raising of seedlings and the botanical differences of the mature canes.

Seedlings.—These had not hitherto been successfully raised in India and there was thus nothing to go upon in the work. Most of the cane arrows at Coimbatore were too old for use, but a series of expeditions to neighbouring villages produced a fairly large number belonging to six or seven varieties. A careful search was first made in these for fertile seed, but after a month's study only one "probable" seed was found. The reason for this infertility was the problem next attacked. Stigmas were observed on many arrows to see if pollen grains were to be found attached to them, and then the pollen sacs were themselves studied. It was found that in the great majority of cases the pollen was undeveloped and the anthers were unopened. Arrows were then collected from the United Provinces, Mysore, Malabar, South Arcot and Samalkota. In some of these (Mysore and Taliparamba) and in others from local sources a few varieties were found which habitually open some of their anthers. Arrows were at once sown from these varieties and a fair number of seedlings were obtained, but it was too late then to do anything on a large scale. Altogether 300 pans of arrows were sown and examined day by day. The raising of seedlings was found to be deserving of quite a special study and the difficulties, chiefly climatic, were one by one surmounted. But of the 70 seedlings obtained in February only 17 have produced strong healthy plants. A later consignment of arrows produced a much better result and it is hoped that about 40 seedlings will be available on the first year's work. With the knowledge gained it may be anticipated with some confidence that as many seedlings can be raised next season as can be dealt with.

Botanical characters of canes.—Thirty varieties of Bengal canes and 5 from the United Provinces arrived before the close of the financial year. The number has now been increased from Mysore and various parts of Madras to 93 and these have been submitted to a careful scrutiny, drawn, photographed and planted in the botanic garden. The synonymy of the Madras canes has been attacked and several interesting discoveries have already been made.

Horticulture.—Most of the spare time in the early part of the year was spent in working out this subject for the benefit of the students, for it was soon found that the methods and descriptions in European text books were quite unsuited to the local conditions. Special attention was devoted to pruning for growth and fruit. The guava was selected for detailed study and as the result of this, it was found possible for the class to prune a tree which had never borne fruit but which, after this treatment, produced nearly 100 guavas. A great number of photographs were taken showing the results of different kinds of pruning and these have been added to the College collection.

Root systems.—The dissections of root systems commenced last year was continued. The neem tree (*Melia azadirachta*), portia (*Theopelia populneus*) and babul (*Acacia arabica*) were added to the list of trees and a large number of field crops were also dissected out and photographed.

Seed testing.—During the year about 150 samples were tested for germination capacity. Besides this ordinary routine work, the seeds of a dozen selected crops were tested and stored in various ways. These are to be again tested every six months in order to obtain some data as to the longevity of ordinary Indian crop seeds and the best methods of keeping them. No work on this subject appears to have been done in India.

7. The botanic garden was maintained and improved in various directions. As before, the want of water was severely felt but some improvements were made in irrigation facilities. The garden is, generally, increasing in beauty and attracts a large number of visitors. During the year 1,192 plants, seed packets, etc., were distributed and 478 received.

The main use of the garden has been to provide specimens for the Botanical laboratory and demonstrations in horticulture. Grafting, layering, pruning for growth, flowers and fruit, root development, etc., formed the subjects of classes in Agricultural Botany and a large number of descriptive labels were put out to assist the students.

Plots of cotton, gogu (*Hibiscus Cannabinus*), castor, mulberry and red gram (*Cajanus indicus*) were grown for experimental work and the collection of sugarcane varieties and seedlings have a temporary home there. A plot of English potatoes was put down, but too late in the season. The growth was good but the outturn was small. It is proposed to plant the crop earlier this year.

The fruit garden continued to receive attention. Figs, grafted guavas and papaws were an unqualified success and cherimoyas (*Annona cherimola*) and pomegranates fruited. The varieties of plantains were grown chiefly as a wind-break and produced a large number of bunches. The grafted mangoes have not as yet done well. Many of them were attacked by fungus disease which was traced to the nursery from which they came. While a few of the citrus collection have become established, it has been found difficult to grow this class of fruit tree. The vines also have not done well but are gradually improving. It will probably take some years before the land is made suitable for these latter.

The Eri House was kept up with a succession of broods and was used to the full for demonstrating eriiculture, while a small experimental brood of mulberry silk worms was also reared, as described below.

8. *Entomology*.—This section was, as usual, under direction of the Government Botanist, but he was assisted throughout by the Imperial Entomologist. Mr. Fletcher visited the college towards the close of the year.

Besides teaching and drafting replies to enquiries of correspondents, the Chief Assistant devoted special attention to silk worms. Seven broods of Eri worms, each 10,000 in number, were successfully reared in the eri house in the botanic garden. A couple of boys, a fieldman and two men from the mufassal (one from South Canara and one from Mysore) were trained in the work. A short leaflet was prepared on eriiculture and a show case made for Agricultural Exhibitions. Consignments of prepared cocoons were sent to Messrs. Binny at the Buckingham Mills, the Basel Mission factory at Calicut and the Wesleyan Mission at Karur to see if the produce could be used in Madras and a market obtained. The results were however unsatisfactory, none of these being able to work up the produce, and at present there is no market in South India for this class of silk. A small experimental brood of mulberry silk worms was raised in the eri house. The seed was obtained from the Tata silk farm at Bangalore but the resulting outturn was very poor, only 200 cocoons being raised from 1,500 eggs. On investigation at Pusa, the eggs were found to be pebrinised. The growth of several kinds of mulberry in the botanic garden was on the other hand perfectly satisfactory. The Assistant spent a large portion of his time in accumulating materials for a bulletin on sericulture in Madras, paying long visits to the chief centres in Kollegal and Berguail. This material has been handed over to Mr. Fletcher. A serious outbreak of stem-weevil on Cambodia cotton appearing in the neighbourhood was carefully investigated and most of the life history of pest worked out. As the position of Cambodia cotton in the neighbourhood is threatened by this pest its full investigation is being pushed on.

The Second Assistant was engaged in touring in the northern half of the Presidency. His chief work was the further investigation of the Deccan grasshopper outbreak in the Ceded districts. The main results of his work, which have been fully reported elsewhere, may be summarised as follows. The hopper trap which had given good results in the previous year was considerably improved and did effective service against the young hoppers. But it was found to be too expensive for the ordinary ryot's use and had to be abandoned on that account. Bags of the Mysore pattern used by Dr. Coleman were tried side by side with the trap and on the whole proved satisfactory. They are considered to be more useful than the tin trap because of their comparative cheapness. Ploughing for the destruction of the egg masses was continued at various times and in various circumstances. Considerable difficulty was experienced in this matter because the ground was usually so hard when first freed from the crops, and no definite conclusion was arrived at. The last ploughing experiments were made in January of this year and the results will be investigated later on. Considerable progress was made in the further study of the life history of the pest, especially as to its natural enemies.

The Third Assistant was deputed to make a general investigation in the southern districts of the insect pests on the crops. He visited about 20 taluks and his collections were worked out at head-quarters. Wherever possible these officers gathered the ryots together and demonstrated simple means of combating the pests.

9. The Artist, besides a variety of desultory plan and map drawing, prepared 38 diagrams in pen and ink for botanical and 12 for zoological and entomological class work. Our collection of lecture illustrations has thus been considerably increased. Hardly any of the diagrams used for teaching in temperate regions are of any use in Madras.

COIMBATORE,
1st June 1912.

C. A. BARRER,
Government Botanist.

APPENDIX V.

ANNUAL REPORT OF THE MADRAS MYCOLOGIST.

I have the honour to submit my administrative report for the year ending 31st March 1912. I remained on duty throughout the year as did also my Chief Assistant and Plant Collector. In July M.R. Ry. T. R. Ranganath, L. A., a diplomate of the Coimbatore Agricultural College, was appointed as Second Assistant and is now undergoing training. Three fieldmen's posts and an artist's post were also created and have been filled up. The artist, however, resigned on March 1st and the post is temporarily vacant. The fittings of the laboratory in the Agricultural College are well advanced and much of the apparatus and many of the books have arrived.

During the year I toured for 117 days, half of this time being spent in Gōdāvari and Kistna districts. Other tours were made to Coimbatore, Nilgiris, Malabar and Tinnevely and I was present at the annual meeting of the United Planters' Association of Southern India at Bangalore. My Chief Assistant was on tour for 103 days and the new Assistant for 38 days.

This year again the bud-rot disease of palmyras has claimed most of my attention. The infected area in Kistna district has been considerably lessened, but that in Gōdāvari district is almost the same as it was last year. Attention has been paid to cases in which the death of the central leaf is not the first ordinary symptom of disease, but in which rows of characteristic spots on the expanding green fan of the leaf is the first sign. As the segments of the leaf protruding from the bud open out, the fungus on the spots produces spores which are in a good position to be blown to other palms. Such palms live as long as 8½ years in this state before the growing point is killed. They form about 2 or 3 per cent. of the palmyras that become diseased. They are not being out and burnt during the course of the operations, yet they act as "carriers." A proposal has been made to introduce legislation with a view to have them dealt with. A note on the subject has been sent to the Agricultural Journal of India. The investigation of the methods by which the disease is spread is progressing. There is no doubt but that the principal ways are by human agency, insects and the wind; other agencies, as birds, are occasional and fortuitous.

An examination was made of palmyras in the southern part of the Nanguneri taluk in Tinnevely district. It was found, however, that they were suffering not from disease but from a succession of abnormally dry seasons.

In Ponnani taluk, South Malabar, spraying of urea nuts against Koleroga disease was demonstrated to the garden owners. They are willing to have the spraying extended this year before the break of the rains and two others have written to ask that spraying may be done in their gardens. As the cost of spraying is very small compared with the gain expected it is likely that the operation will be successfully introduced here.

The help given with the set selection of sugarcane against red-rot was continued at Coimbatore and Samalkota. Successful inoculations with sugarcane smut were got at Samalkota and this investigation is being continued.

The field works on paddy smut this year lead to no results. It will be repeated.

A copper sulphate steep has been found an efficient and cheap remedy for smut on cholam. The cost per acre is only about one anna. My Chief Assistant is continuing the work on infection and problems connected with it.

A wilt on Sunn hemp grown for green manure was studied and a *Fusarium* isolated. Inoculation experiments are in progress to test whether this fungus is the cause.

Twenty-four parcels of diseased plants were sent for advice as to how to treat the diseases. This is a small number but it shows that people outside the department are beginning to take advantage of this section and I hope the number of references will greatly increase in the future.

Specimens of 56 fully-named fungi were added to the herbarium. Seventy-six more are named to the genus and with the help of the recently acquired copy of Saccardo's *Sylloge* the specific names are being worked out.

A short course on plant diseases was given to the second-year students.

COIMBATORE,
16th April 1912.

W. McRae,
Madrās Mycologist.

APPENDIX VI.

REPORT OF THE HONORARY DIRECTOR OF FISHERIES, CHEPAUK.
FOR 1911-1912.

Brief report on Inland Piscicultural work.

The fishery work on the Nilgiris during the financial year 1911-12 has progressed satisfactorily, all the suitable rivers being stocked with *Salmo trutta*.

The upper section of one of the streams on the Kundahs (Billiter Halla) is stocked with *Salmo fario* and the section below the falls with *Salmo trutta*; both of these have done very well.

The fishing was opened last year on the following rivers, viz., Pykara, Krungand, Avalanche and Emerald Valley; and the largest trout taken weighed 5½ lbs. This year the lower section of the Billiter Halla, i.e., from immediately below the falls just above where the Bangi Tappel road crosses the stream down to where it joins the Bhavani, will be opened for fishing in addition to the above rivers.

The Lawrence Asylum Lake and Tiger Hill Reservoir will also be opened.

2. The rivers below the Nilgiri slopes, viz., Bhavani and Moyar, the upper reaches of which have been under conservancy for the past few years, are beginning to show the benefits. During the year, I inspected these and found the fish supply to be exceedingly good, compared to what it used to be. Independent evidence as to increased catches of the fishermen lower down on these rivers was given to the late Inspector Mr. Loulie.

I am confident that in a few more years the rivers in question will have recovered from the serious depletions which were carried on from time to time by illegal methods, viz., fixed engines, destruction of spawners on the shallows, wholesale destruction of fry in the upper waters by fixed fine mesh basket traps, use of dynamite in the deeper pools, etc.; all of those destructive methods have been stopped.

Cauvery conservancy.

3. The annual beat below the Hoginkal Falls on the Cauvery river, which has been going on for many years, has received my attention and the use of dynamite in the deep and narrow channels below the falls where the fish are driven to, has been stopped so that the great destruction of fish life has to a large extent been prevented.

I find that the actual men engaged in this beat as well as the wholesale poaching on the Bhavani and Moyar, which used to take place each year, are not the professional fishermen, but a varied collection who travel considerable distances to operate on these rivers when they are low, and the fish are easy to destroy—especially when a large number of men combine.

Fish farming.

4. A fish farm has been designed and constructed at Sunkesula, Kurnool district.

The object of the farm is—

(1) To deal with and re-stock the waters of the district each year by breeding, either artificially or naturally under protection, the more valuable of the Indian indigenous fish.

(2) To demonstrate breeding for market purposes.

(3) To rescue large numbers of immature fry from the rivers and canal, when all waters subside, keep and grow until the dry season is over. This is a most important function of the fishery as these fry which range from 1 to 3½ inches, when rescued from certain destruction on the waters drying, have over three months' growth under protection at the farm. When they are turned loose in the canal, they have attained such growth as to be better able to protect themselves and form an immense additional food value.

The buildings are not quite complete, but I am pleased to say the breeding arrangements, stock and fry ponds have been in use for some time. A valuable lot of breeders are kept in stock at the farm.

Since operations began the ova of the *Ophioccephalus punctatus* have been successfully dealt with and their life history is being worked out.

Special appliances for artificial hatching and rearing of the fry have been designed and constructed.

Experiment in transport of above eggs, minute fry, as well as the mature fish are being carried out, and when complete will be a valuable asset for breeding for market purposes.

Contrary to what has been generally understood the eggs of the *Ophioccephalidae* are not demersal but float.

The nests are mostly constructed in reeds where a circular clearing is made by the fish by biting the reeds short and compressing them; this prevents the eggs from being blown away or distributed by the wind. Alongside the nest a small tunnel is generally formed by the fish bending the reeds over, and this is used for keeping guard as the eggs and subsequent fry are under parental care.

Both during the egg stage and after hatching great destruction goes on in nature by frogs and aquatic beetles, etc., the former are generally accounted for by the parent fish, but the loss from the period of extrusion to the fingerling period is very great.

The little fish after hatching remain floating until the yolk sac is nearly absorbed excepting periodical excursions like mosquito larvae downwards a few inches and back again to the surface. After the yolk is absorbed they feed about the nest and a little later they move amongst the reeds but constantly under parental control.

Hilsa operations.

5. Some three years ago a "hilsa hatchery" was constructed at the Lower Anicut on the Cauvery, consisting of Macdonald jars and appliances. A great number of eggs were dealt with under most difficult conditions. A large number of fry were turned out in the most suitable waters obtainable in this river with access to the sea, and several hundred thousand fertilised ova were transported to the Ponnani river on the West Coast. As I had to rely on manual labour for pumping to work the hatching jars and this failed on several occasions generally during the night, a large number of ova were consequently destroyed, necessitating all the work over again.

The fishermen caused inconvenience by refusing to bring fish for stripping and fertilising purposes and by mutilation causing blood to enter the ovaries rendering the eggs useless.

Owing to these combined difficulties I had to close the hatchery down. The introduction of hilsa to the West Coast rivers will eventually open up a very valuable and important fishery and as there are no anicuts on the rivers, the fish will have free access to their spawning grounds.

The result of transport of the eggs to the Ponnani river over two years ago cannot be ascertained for certain until the third year, as they remain in the sea for two to three years, two year olds only occasionally entering the river. One remarkable fact which holds out great future hope is the capture of a two-year old hilsa at the mouth of the Ponnani river.

I have now selected another ground for hilsa operations on the Kistna and Gōdāvari rivers. The hatching apparatus I am proposing to construct on a boat which will be able to work both of the above rivers and utilise the Collair Lake (which is accessible from either river) as a fry growing ground.

6. The other work carried out by this department is the stocking of tanks, inspection of sites and drawing up plans for live fish market and fish farm for Nellore district, etc. Experiments with mosquito larvae destroying fish are being carried out and information given to the medical authorities.

Marine Pisciculture in Madras.

In accordance with G.O. Press No. 3168, Revenue, dated 28th October 1911, and with your letter Dis. No. 540, dated the 2nd November 1911, I have the honour to submit the following summary of the progress of Marine Pisciculture in Madras Presidency during the past year 1911-12.

2. The work done has consisted in the main of—

(a) A continuation of the experimental culture of edible oysters which was begun in Pulicat Lake in 1910.

(b) The compilation of a practical guide to marine fish-farming as practised successfully in France and Italy.

(c) A survey of backwaters, creeks, and swamps on both the East and West coasts of the Presidency with a view to select sites and formulate a working scheme for the inception of marine fish-farming on a scale sufficiently extensive to demonstrate conclusively whether this work is economically suitable under Indian conditions.

(d) The preparation of a scheme for the creation of a breeding reserve of pearl oysters on the Tinnevely coast and the elaboration of a method for the artificial inducement of pearl formation.

3. *Oyster culture.*—The experiment has so far been a marked success; the attachment of spat upon various forms of spat-collectors has been on a satisfactory scale and from these it is apparent that the principal spatfall occurs during the hot weather from July to September inclusive. Oysters derived from the spatfall of 1910 are now sufficiently advanced to warrant being put upon the market during the present year 1912. The experience gained during the past eighteen months has shown that the principal species of oysters found in Madras waters is readily amenable to very simple methods of culture; the experiments were begun with a considerable amount of elaboration of detail; one by one simpler methods were successfully substituted. The practice as now followed is extremely economical and is capable of meeting an extensive demand while still maintaining large breeding reserves and an ample supply of young stocks.

4. *Marine fish culture.*—Fisheries Bulletin No. 6 which was issued in 1911 contains an exposition of the methods of fish-farming pursued at Arcachon in France and at Comacchio in Italy. In consequence of this report, the Madras Government desired that a suitable site for a fish-farm should be selected and plans and estimates drawn up. Representative backwaters and creeks in all the maritime districts were inspected and as a result, plans and estimates for two farms aggregating about 180 acres in area in the neighbourhood of Tuticorin have been submitted to Government for consideration. The estimated non-recurring cost of this scheme amounts to Rs. 4,410.

5. Considerable interest in the methods of fish-farming was aroused at several of the centres visited, and has resulted in the application for a concession of a site in Sonapur backwater, Ganjam district, the applicant agreeing to observe the instruction of the Fisheries Department in the laying out and conduct of the farm. Government have been recommended to grant the application.

6. *Pearl oysters.*—The continued and absolute dearth of pearl oyster spat on the Tinnevely pearl banks has again prevented the carrying out of cultural work. A scheme has, however, been worked out whereby on the discovery of the next extensive spatfall an attempt will be made to protect a small bed of these young oysters until they reach maturity, with the object of creating a breeding reserve. If the method should prove even moderately successful it is proposed to extend it with a view to effect the eventual replenishment of the beds and the resuscitation of an industry formerly exceedingly profitable to the coastal population of the Tinnevely and Ramanad districts.

7. *Pearl inducement.*—Experiments in the artificial inducement of free or orient pearls carried on by the writer has given satisfactory initial success; work is now at a standstill for want of suitable material for further experiments. Several perfectly spherical and highly lustrous pearls have been obtained by the process employed, but the time given them to develop was too short to admit of growth beyond minute dimensions.

GOVERNMENT OF MADRAS.

REVENUE DEPARTMENT.

Read—the following papers:—

I

Proceedings of the Board of Revenue (R.S., Sur., L. Eds. and Agri.),
No. 396, dated 30th July 1912.

F. C. PARSONS, Esq.

Read—the following paper:—

Letter—from G. A. D. STUART, Esq., I.C.S., Director of Agriculture, Madras.
To—the Secretary to the Commissioner of Revenue Settlement, Survey, Land
Records and Agriculture.
Dated—the 10th July 1912.
No.—Dis. 1556.

I have the honour to submit my report on the operations of the Department of Agriculture for 1911-1912.

Resolution—No. 396, dated 30th July 1912.

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 1911-1912.

2. *Staff.*—Mr. M. E. Couchman, I.C.S., who held charge of the office of Director of Agriculture since the reorganization of the Agricultural Department in 1905-1906, finally severed his connection with it and proceeded on one year's furlough on the 9th August 1911 and Mr. G. A. D. Stuart, I.C.S., was appointed Acting Director of Agriculture. Mr. H. C. Sampson was, on return from leave, placed on special duty for conducting a cattle survey of the Madras Presidency. The period of special duty was originally fixed at three months but was subsequently extended to 8 months. Mr. H. Southern, Probationary Agriculturist, was in charge of Mr. Sampson's Office from 22nd April up to the end of the year. M.R.Ry. D. Ananda Rao Garu, Assistant Director of Agriculture, Northern Division, was confirmed in his appointment with effect from 18th January 1912. His headquarters have been changed from Samalkota to Rajahmundry. M.R.Ry. K. Ramasastrulu Nayudu Garu, Assistant Director, Southern Division, is still on probation pending his passing an examination in a vernacular language. The post of Entomologist referred to in the last year's review has been filled up by the appointment of Mr. T. B. Fletcher, Supernumerary Entomologist at Pusa. He joined duty on 24th April 1912, that is, after the close of the year. The minimum pay of Assistant Farm Managers was raised from Rs. 25 to Rs. 35 during the year, with the result that six out of the seven vacancies in the grade have been filled up. The sanction of Government has just been received for the creation of seven more posts in the second grade of Farm Managers, and the Board shares the hope expressed by the Director that, with the increased staff, the work of the department will expand in every direction in the future.

3. *Agricultural stations.*—During the year under review, two new Agricultural Stations were sanctioned, one at Anakapalle in the Vizagapatam district and the other at Manganallur in the Tanjore district. The land required for the latter farm

is to be leased from the owner for a period of seven years and regular work is reported to have commenced with the current year. The land required for the former has not yet been acquired and handed over to the Agricultural Department. On the other hand, three of the old farms were ordered to be abandoned, viz., those at Hindupur, Bézvada and Bellary. The season was favourable at the central farm, Nandyal and Samalkota.

Sugarcane.—The area under red Mauritius near Nellikuppam in the South Arcot district continues to increase. The sugar industry in South Arcot is stated to be on a firm basis and capable of great expansion. In Malabar, the red Mauritius is being replaced by Barbados No. 208 which is stated to be better suited to West Coast conditions. Ryots are taking great interest in the manufacture of jaggery by means of iron mills.

Groundnut.—This crop gave much promise when it was first introduced into Malabar. But it has suffered so much from the ravages of wild animals that it has received a set-back. The crop has, however, established itself in some parts of South Malabar.

Cotton.—Work on the lines described in previous years' reviews continues and it is gratifying to see that the improvement in the quality of karunganni is still maintained. Efforts are also being made by the Agricultural Department to improve the quality of this crop in Kurnool and Bellary, where the work will be greatly expanded during the current year. It is expected that a marked effect on the general crop of these districts will soon be visible, and the Board hopes that this expectation will be realised.

Paddy.—The efforts in the direction of popularising single-seed planting have been encouraging and the practice of single planting is spreading rapidly, specially in the southern districts of Tanjore, Madura, Tinnevely, South Arcot, Coimbatore, Malabar, and Chingleput. The adoption of reduced seed-rate throughout the Presidency will, the Director calculates, result in an enormous gain to the ryots. The Board has recently instructed all Collectors to furnish the Director of Agriculture with statistics of the area cultivated under this system, and it is hoped that accurate data will be forthcoming in the future showing the extension of the area cultivated in this manner.

Green manuring.—The interest aroused in the cultivation of this crop continues. The Agricultural Department has been endeavouring to supply a sufficient stock of green manure seeds. The demand for them is said to be heaviest in Tanjore and Madura. The prices at which the seed is sold by the Agricultural Department are so fixed as to realise a profit of about 10 per cent. over the market price, thus leaving room for private enterprise.

Sericulture.—The attempt made at Coimbatore to raise a small experimental brood of mulberry silk-worms proved a failure, the eggs having been pebrinised. Similar efforts made with eri silk worm proved successful. The Director considers that the weaving and spinning of this silk can be established as a cottage industry in this Presidency, and all that is wanted therefor is the opening of a small spinning and weaving factory at a suitable centre.

4. *Agricultural Instructions at the College of Agriculture.*—The second batch of students admitted in 1909 completed their three years' course at the end of the year under report. Ten students obtained the diploma out of the 12 that went up, while 14 passed out of the 16 second-year students who were examined for the diploma. These results were reported to Government and they were pleased to endorse the Board's opinion that these results were highly satisfactory. The proposals referred to by the Director of Agriculture in the concluding portion of paragraph 8 of the report have been submitted to Government.

5. *Non-official visitors to the College.*—The Director states that only three visits were paid by non-official visitors to the College during the year under review. The term of appointment of the honorary visitors having expired, fresh appointments have been made by Government. The appointments are for a period of three years, and the Board hopes that greater interest will be evinced by these gentlemen in the work of the College.

6. *Agricultural Associations and Exhibitions.*—Cattle shows were held at Ongole and Tiruppur during the year. Mr. Stuart does not wholly share the views of his predecessor as to the lack of practical value of these shows, but is of opinion that the shows just mentioned which he has attended appear to have some practical value. The only Agricultural Associations which appear to take an active interest in their work are, according to Mr. Stuart, those of Kumbakonam, Malabar and South Canara and possibly Ganjam. The rest, he says, are extinct or almost so. Like his predecessor, Mr. Stuart despairs of getting any good out of these associations and considers that their constitution proceeded on wrong lines from the beginning. The proposal made by Government in the matter of combining these associations with co-operative societies was referred by the Board to all Collectors, the Director of Agriculture, and the Registrar of Co-operative Societies. Replies have been received from all officers except the Registrar, and the Board's reply to Government will be submitted on receipt of his report.

7. *Meteorology.*—The rainfall registered at the various rain-gauge stations in the Presidency 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 1911-1912 was 473 inclusive of 82 in the Native States and Coorg against 472 at the end of the previous year, and of these 399 stations were inspected.

8. *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 half-yearly reports of cattle mortality.

(True Extract.)

S. VENKATARAMADAS,
Secretary.

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

II

Proceedings of the Board of Revenue (R.S., Sur., L. Rds. and Agri.),
Mis. No. 2678, dated 6th August 1912.

The Hon'ble Mr. F. C. PARSONS.

Read—the following paper:—

Letter—from H. C. SAMPSON, Esq., Director of Agriculture, Madras.
To—the Secretary to the Commissioner of Revenue Settlement, Survey, Land
Records and Agriculture.
Dated—the 28th July 1912.
No.—Dis. 1701.

I have the honour to enclose copies of the Honorary Director, Madras Fisheries' review of the working of that department during the year 1911-12.

Details of the work done during the year have been printed as Appendix VI to the Administration Report of the Agricultural Department forwarded with this office letter No. 1586, dated 11th July 1912, and I have the honour to suggest that the Honorary Director's review may be printed as a continuation of paragraph 23 of the Director of Agriculture's report prefaced as follows:—

The following is Sir F. A. Nicholson's, the Honorary Director, Madras Fisheries, review on the working of his department for the year.

Resolution—Mis. No. 2678, dated 5th August 1912.

Submitted to Government in continuation of Board's Proceedings No. 396, dated 30th July 1912.

(True Extract.)

S. VENKATARAMADAS,
Secretary.

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

Order—No. 2478, Revenue, dated 17th August 1912.

Miscellaneous.

Recorded.

2. The Report on the Operations of the Department of Agriculture during 1911-12

has been submitted by the Board of Revenue with commendable punctuality. The report is full of interesting information and contains for the first time a review of the valuable work done by the Piscicultural department under Sir F. A. Nicholson. The Government are pleased to note the steady advance made in popularising and extending to tracts where they were before unknown the adoption of practices such as the purchase of fresh improved seed, of economy in the use of seed, growing green manure crops and adopting suitable rotations, which cannot but be of immense benefit to the agricultural community. Indeed the Director estimates the saving in seed alone which would result from the universal adoption of single planting of paddy at a crore of rupees *per annum*. Considerable success has also been achieved in spreading the cultivation of sugar-cane and the local manufacture of jaggery by the use of iron mills, and in improving the quality of cotton and stimulating the spread of cultivation thereof in Tinnevely, Kurnool and Bellary.

3. Sanction was accorded to the opening of two new agricultural stations—one at Manganallur in the Tanjore district and the other at Anakapalle in Vizagapatam. On the other hand, the agave plantation at Hindupur and the Bezwada agricultural station were closed during the year and the Bellary agricultural station has since been ordered to be abandoned owing to the infertility of the soils and their unsuitability for experimental purposes. Much valuable work was done at the other agricultural stations and these continue to attract a large number of visitors, while the growing volume of correspondence and enquiries is a further gratifying indication that the educated cultivating classes are beginning to realise the advantages and utility of the department.

4. Ten out of twelve students of the College of Agriculture obtained their diplomas in the examination held in March 1912. The results at the examinations have been highly satisfactory. The proposals referred to by the Director for a revision of the college curriculum and for avoiding the wastage that at present occurs in the classes during the college course are now separately under the consideration of Government.

5. Research and experiments were conducted in chemistry, botany, entomology and mycology. The Government Mycologist was engaged with the budrot disease of palmyras in the Godavari and Kistna districts and the Government are glad to learn that the disease has appreciably abated in the Kistna district. The Government consider that Mr. Harrison's researches on the gases evolved from land occupied with paddy crop will be very interesting and they await the publication of the results of these experiments. The want of a whole-time Economic Botanist continues to impede the work of the department.

6. The Government regret to note the lack of public interest in cattle shows of which only two were held during the year under review as against nine last year. They observe however with pleasure that the agricultural associations on the West Coast are co-operating with the Agricultural Department in endeavouring to enable the ryots to profit by the improvements effected by the department. Elsewhere these

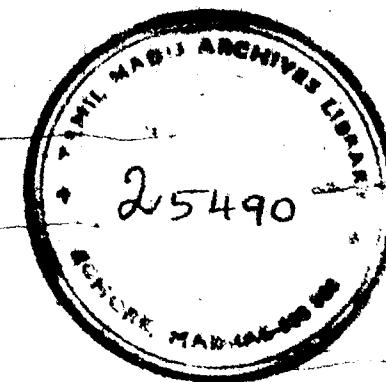
associations appear to be defunct or in a moribund condition. The question of their working came recently to the notice of Government and orders have been passed in G.O. No. 2677, Revenue, dated 2nd September 1911, on the future constitution of the Central Agricultural Committee and of District Agricultural Associations. A report is shortly due to Government on the proposal to combine these associations with Co-operative Credit Societies.

(True Extract.)

L. M. WYNCH,
Ag. Secretary to Government.

To the Board of Revenue (Revenue Settlement).
" K. T. B. Treasurer, Esq., Superintendent, Industrial Education.
" the Educational Department.
" the Local and Municipal Department.
" the Public Department.
" the Public Works Department.
" the Agricultural Adviser to the Government of India.
" the Minister of Agriculture, Argentine Republic.
" the Entomologist to the Government of India.
" the Mycologist
Copy to the Government of India, Revenue and Agricultural Department (with C.L.).

Editors' Table.



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N12