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REPORT
ON THE
OPERATIONS OF THE DEPARTMENT
OF AGRICULTURE
MADRAS PRESIDENCY
FOR THE YEAR
(1925-26)



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MADRAS
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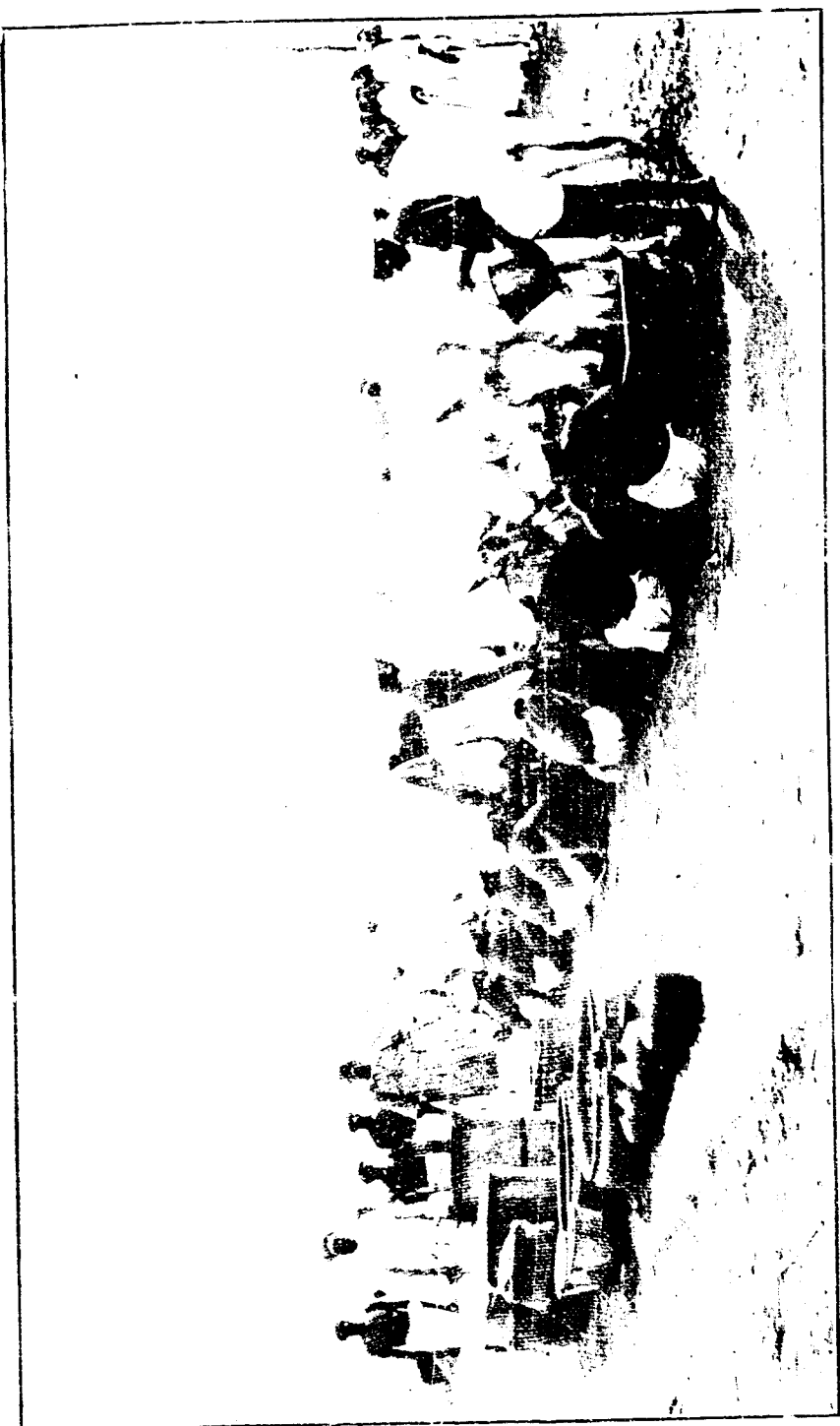
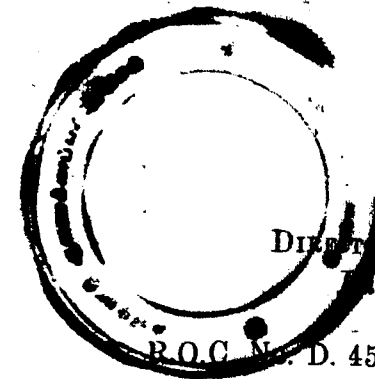


Fig. 1. The group of children in the choir.



25
OFFICE OF THE
DIRECTOR OF AGRICULTURE, MADRAS,
Dated 2nd August 1926.

R.O.C. No. D. 45 Pdl./26.

From

R. D. ANSTEAD, Esq., M.A.,

DIRECTOR OF AGRICULTURE,

MADRAS,

To

THE SECRETARY TO GOVERNMENT,

DEVELOPMENT DEPARTMENT,

FORT ST. GEORGE, MADRAS.

SIR,

I have the honour to submit the report on the operations of the Department of Agriculture for the year 1925-26. An attempt has been made in this Report to describe the salient features of the work of the Department and to make it of a "popular" nature and of interest to the general public, rather than to scientists. For details of the work being done I would refer to the reports of the research and circle officers, and to the monthly digest which I personally compile and which is a running commentary on the work of the Department.

I.—ADMINISTRATION.

A.—STAFF.

2. I was on leave for eight months and ten days from 10th April 1925. During this period, Mr. G. R. Hilson, Cotton Specialist, was officiating as Director of Agriculture. I was in charge for the rest of the year.

Indian Agricultural Service.

3. *Confirmation.*—Mr. Saadat-ul-lah Khan, Probationary Deputy Director of Agriculture, was confirmed. Mr. R. O. Iliffe, Economic Botanist, Ceylon, was appointed to the post of Paddy Specialist on a five-year contract and he took charge on 27th November 1925.

4. *Deputation.*—Messrs. R. C. Wood and F. R. Parnell continued to be on leave preparatory to retirement, and Dr. McRae continued to be on deputation during the year. Mr. D. G. Munro, Deputy Director of Agriculture, returned from leave on 6th January 1926, and resumed the post of General Scientific Officer, under the United Planters' Association of Southern India, on foreign service. Mr. G. R. Hilson, on relief as Officiating Director, was on deputation for one month under the Ceylon Government to advise that Government regarding the possibility of growing cotton in Ceylon, and thence proceeded on eight months' leave.

5. *Retirement.*—Mr. R. Thomas, Deputy Director of Agriculture, who was on deputation under the Iraq Government, retired on proportionate pension on the 9th December 1925.

Madras Agricultural Service.

6 Three new posts were sanctioned in the Madras Agricultural Service during the year, two for the Paddy Specialist's section and one for the Cotton Specialist's section. M.R.Ry. C. R. Srinivasa Ayyangar Avargal was appointed to the first of these posts at Maruteru. The second post will be filled up during the current year when the Pattambi station is actually started. M.R.Ry. V. Ramanatha Ayyar Avargal has been appointed to the post of Assistant Cotton Specialist. A temporary post of Assistant to the Deputy Director, Live-Stock, was sanctioned for five years, and Mr. R. C. Woodford was appointed to it. M.R.Ry. C. Narasimha Ayyangar Avargal was appointed to the post of Lecturer in Agricultural Engineering in the vacancy caused by the death of M.R.Ry. C. Sundararama Ayyar Avargal.

Non-gazetted Executive Staff.

7. Twenty-two posts were added to the upper subordinate cadre of the Agricultural section. Of these 12 remained vacant till the end of the year for want of suitable candidates. A temporary upper subordinate was also sanctioned for conducting the betel vine experiments in Coimbatore. Four posts of upper subordinates were added to the Scientific section to provide for the expansion of work in the Paddy and Millets sections.

B.—BUILDINGS, ETC.

8. Good progress was made towards the completion of the new Freeman Building and this, when formally handed

over for teaching, will greatly relieve the congestion at present felt by research officers in the present building. Satisfactory progress was also made with the construction of three "C," nine "D," and one "E" type quarters on the College estate.

All the buildings and roads in the Chintaladevi Cattle Farm, the execution of which were entrusted to the P.W.D., have been handed over to the Deputy Director of Agriculture, Live-Stock, during the year. The construction of water troughs at Chintaladevi has also been completed.

9. The following is the list of works undertaken departmentally and completed during the year:—

- (i) A cement channel for irrigation purposes at Anakāpalle,
- (ii) a permanent threshing and drying floor at Hagari,
- (iii) a combined cattleshed and watchman's shed at Pelakuppam,
- (iv) a copra drying floor with a store room at Kāsaragōd,
- (v) two temporary coconut stores and three incinerators at Nileshtar,
- (vi) an extension of the store at Taliparamba,
- (vii) a poultry shed at the Agricultural Middle School, Taliparamba,
- (viii) quarters for farm manager, assistant farm manager and clerk, and coolie lines, and a water cistern for cattle for Nanjanad,
- (ix) erection of a refrigerator at the Coimbatore dairy,
- (x) a cement irrigation channel and a new field laboratory at the Cotton Breeding Station, Coimbatore,
- (xi) provincial officer's quarters, seed store, drying cage, seedling stand, and a latrine for the rest house at the Paddy Breeding Station, Aduturai, and
- (xii) a storage tank at the Paddy Breeding Station, Maruteru.

Besides the above, the Assistant Agricultural Engineer carried out several works on the College estate, the aggregate cost of which amounted to Rs. 23,900. The most important of them were—

- (i) Construction of culverts, well revetment, and new roads,
- (ii) annual repairs to Hostel blocks and roads, and
- (iii) construction of a fuel shed and a gas house, and another shed for the engine.

10. The drainage scheme has not yet been carried out. This is very badly needed and the sanitation of the estate will never be satisfactory until it is completed. A good scheme connected up to an Activated Sludge plant is highly desirable to act as a demonstration of modern methods of handling sewage and converting it into fertiliser which can be used on the land.

II.—AGRICULTURAL EDUCATION.

11. *Courses of study at the Agricultural College.*—With the examinations in 1925, the Certificate course came to an end leaving only the Degree course in progress during the year. In addition to the usual lectures given by the teaching staff, special lectures were delivered by the Sugarcane Expert, the Millet Specialist, the Assistant Cotton Specialist, and the Personal Assistant to the Director of Agriculture. Students of classes I, II, and III went on tour as usual. The Academic Council of the Madras University refused to accept our proposal to institute a special Intermediate in Agriculture on the grounds that the alterations that had been made in the University Intermediate Examinations would meet our requirements. Under these circumstances attention was devoted to an extension of the Degree course. The selection of students for this course was made as usual by a committee consisting of the Hon'ble the Minister for Development, the Director of Agriculture, and the Acting Principal of the College. There were 63 applicants, out of whom 25 were selected. All these actually joined on the opening date, but three afterwards resigned, leaving a class of 22. The number of students on the rolls during the year, was as follows:—

		Degree Course.			Total.
		Class I.	Class II.	Class III.	
Beginning	...	25	19	7	51
End	...	22	19	7	48

12. *Scholarships.*—The scholarships of Rs. 25 per mensem granted to six students in the two previous years were continued and the following were granted during 1925:—

- (1) The best student of B.Sc., Class I—K. Ramathan.
- (2) Two scholarships to members of depressed classes—M. K. Padmanabhan and P. Uttaman.
- (3) One scholarship to a deserving student from the agricultural community—T. Krishna Reddi.

The scholarship available for Muhammadans was unclaimed as no student from this community applied for admission to the College. With the permission of Government, this scholarship was, therefore, transferred to a student of Class II, S. Mayandi. One scholarship was withheld for lack of an eligible candidate. The Pentland Scholarship awarded to a student of the previous year was also continued.

13. The results of the B.Sc. examinations held in April 1925 were satisfactory. Out of eight students who appeared for Part I, six were successful, while out of twelve students who appeared for the final examination, eleven were successful in obtaining a degree. One special student who was not eligible for a degree passed the examination and was awarded the College L. Ag. Diploma.

14. *College Day* and the usual Agricultural Conference was held in July, presided over by Sir T. N. Sivagnanam Pillai.

15. *Agricultural Middle Schools.*—The Agricultural Middle Schools at Anakāpalle and Taliparamba continued to function during the year. The opening of a third agricultural middle school at Kālahasti in Chittoor district was sanctioned during the year, but the school has not yet been started pending the training of teachers at the Training College and the completion of the buildings.

16. Forty-five boys have now passed from the Taliparamba School, 14 in 1923-24, 13 in 1924-25, and 18 in 1925-26. Nine of the 1924-25 batch, and 14 of this year's batch, underwent a simple course of dairying at Coimbatore. There are now 31 boys on the rolls, and the school has been thrown open to castes other than Nāyars. The Anakāpalle School has not been altogether a success, and there appears to be a very small demand for this class of education in this locality. The total number of students at the end of the year was only 17, the corresponding number last year being 21.

17. These schools are still in an experimental stage and their success must ultimately be judged by what becomes of the boys after they leave the school. Of the 45 boys who have left Taliparamba, 13 are known to be directly engaged in farming their own lands, so that the school cannot be said to have altogether failed in its object.

18. The Agricultural School at Anakāpalle admitted 12 students in the first year class. Despite a vigorous recruiting campaign in villages where demonstrations are being given, and where the Department is best known, there is a

disappointing response from the public to make use of this school. In the final examination the second year class showed that they had made a better use of their time than the batch who passed out of the school in 1925. It remains to be seen whether they will return to the land.

19. *Rural education*.—The classes for juvenile and adult labourers at the agricultural stations at Coimbatore, Pālūr, and Anakāpalle continued to work during the year with satisfactory results. A special report on the working of these classes has already been submitted to Government.

20. The cost of these schools is, no doubt, on the high side, since the attendance is small, but they have a value of their own because the boys catered for would probably receive no education at all did they not come to these schools. They learn familiarity with improved methods of agriculture which they see going on at the experiment stations, the use of improved implements, and a certain amount of discipline, and they are capable by the time they leave of reading departmental publications, such as leaflets, in the vernacular. This must help to fit them to become better labourers. These schools do not aim very high, but they play a useful, though modest, rôle in the difficult problem of the agricultural education of the country. In one case at least a boy from one of these schools is now a teacher in a village school and others have proved themselves suitable for demonstration coolies.

III.—SEASON AND RAINFALL.

21. The south-west monsoon commenced on the West Coast earlier than usual, i.e., about the end of May, and gave heavy rainfall till the beginning of September with breaks in the middle of June and in the second week of July. There were heavy floods in July in all the rivers in South Kanara which damaged the crops near them to some extent. The Circars received good and fairly well-distributed rainfall. The monsoon was weak in Salem and the South. In most of the other districts, the monsoon was late and feeble at first but strengthened about the middle of July and gave fairly good rains till the end of August; there was little rainfall in September. The south-west monsoon was, therefore, favourable only in the Circars and on the West Coast.

22. The north-east monsoon commenced in the beginning of October and heavy rains were received in the first half of the month in the Circars and the Carnatic and on the

West Coast. The monsoon slackened thereafter in the Circars (except Guntūr), but there was heavy rainfall in most of the other districts, especially in the Carnatic and the South which filled the irrigation sources; serious floods were received in the Tambraparni; excessive rains affected the condition of crops in several districts and caused abnormal increase of some of the more important insect pests. On the 10th and 11th November, a cyclone swept over the Coast of Malabar from Badagara to Cannanore and inland for a distance of about 20 miles, resulting in loss of life and damage to a number of fishing boats, thatched houses, and coconut and plantain trees. On the whole, the north-east monsoon was favourable and the rainfall during the period was up to or above the average in all districts except Salem and Trichinopoly.

23. The effect of the season on the crops at the agricultural stations and on the work of demonstrating agricultural improvements in the districts is described below:—

The season was favourable at Anakāpalle. At Samalkōta, the yield of paddy was low owing to insect pests and rain at flowering time, but the yield of sugarcane was better than in the previous year in spite of the appearance of red-rot and "mosaic." At the Guntūr farm most crops were affected by excessive rains; the yield of cotton was reduced by the unfavourable season and insect and fungus attacks; chillies were attacked by thrips and failed, but *variga* (common millet), bengal gram, and tobacco gave fairly good yields. At Nandyal the season was favourable for wet crops, but rains interfered with the preparatory cultivation and sowing of dry crops and produced weeds in abundance which could not be removed in time; the yield of paddy was about normal, but the green manure crops were more or less a total failure. At Hagari, the *mungari* (early) season was a failure and the *hingari* (late) season was late by about a month; the season was about normal for cholam; bengal gram suffered from untimely rains and the bengal gram caterpillar (*Chlodea obsoleta*); ragi suffered from drought in the early stage and too much rain at flowering time. The unusual rains in December affected *hingari* cotton, both at Nandyal and Hagari. They not only caused heavy shedding of leaf, flower, and boll, but also prolonged the vegetative period which resulted in the premature bursting of bolls and less yield of kapas. At Pālūr paddy and groundnut suffered from heavy rains before harvest; dry land cultivation was imperfect and the late sown dry cereals gave low yields; sugarcane suffered

from stem-borer in the early stage and "mosaic" disease later on. Crops were fair at Palakuppam. At Kovilpatti, late receipt of sowing rains and continuous heavy rains in November affected the growth of crops, especially cumbu and fodder cholam; cotton fared better, but the picking was delayed as a result of late sowing. At Taliparamba, the pepper crop was affected by the abnormally heavy rains of October which caused shedding of spikes and pollu disease. The season was favourable to coconuts on the West Coast stations. At the Coimbatore farm the yield of paddy was satisfactory and the season was on the whole favourable for cotton selection work, but the yield of summer cholam was reduced by the attack of *calocoris*, while dry cholam suffered from drought to some extent; bengal gram was affected by heavy rains. At Nanjanad potatoes were affected with potato moth and ring disease and also suffered from drought.

In the I and IV Circles the season generally aided progress in the demonstration of agricultural improvements. In the II Circle the continuous wet weather was unfavourable for demonstration work and there was a set back in the paddy improvement work and in the manurial campaign. In the III Circle progress in cotton improvement work was less than in the previous year owing to the lateness of the sowing season and the unusual rains in December and January. In the V and VIII Circles some of the demonstration plots failed owing to the adverse season while, in the VI, Circle demonstration plots could not be arranged owing to the unfavourable weather. In the VIII Circle the sowing season for cambodia was short owing to late rains and hence the ryots in many places purchased the bazaar seed, with the result that a large quantity of departmental seed was left over and had to be sold for use as cattle-food; the Karunganni seed distributed by the Department did not germinate well owing to heavy rains.

IV.—RESEARCH.

24. The research work carried on by the Department is of two kinds; that done by the specialists at Coimbatore, where they are equipped with laboratories and special stations, and that done on the agricultural experiment stations in the districts. This work is inter-dependent. The fundamental problems underlying the practice of agriculture in this country, of crop pests and diseases, and of the improvement of existing crops by plant breeding methods,

are studied at Coimbatore by a number of experts. Their discoveries are tested out for local conditions on the experiment stations in the districts.

25. This arrangement is necessary because it is essential that any new method should be proved on a field scale before it can be demonstrated to the ryots. A new strain of paddy which does very well at Coimbatore, for instance, may not do equally well in the Tanjore delta, and it is necessary to try it in the latter place on a field scale before it is given out to the ryots as an improved variety.

26. The agricultural experiment stations are used, therefore, to test improved strains, made originally at Coimbatore, to compare them with one another and with local varieties, to test manures of various kinds on different crops under different conditions of spacing, and so on. A good deal of miscellaneous experimental work is also carried out on these stations. Whenever any question arises which is amenable to direct field experiment, more especially local problems, the stations are naturally looked to as suitable places on which to conduct such experiments.

27. Results obtained on these stations, once they have been proved, are demonstrated to the ryots by means to be described later in this report. There are now 31 such stations in the Presidency, some of them designed for the purpose of studying general farming problems, and some, like the paddy breeding station at Aduturai, the potato station at Nanjanad, and the coconut stations on the West Coast, entirely devoted to the study of one particular crop.

28. Such experiment stations, with their expert staff, are absolutely necessary, and all attempts at demonstration must be preceded by careful research on them. The problem of making the results of the research carried out on such stations known to the cultivator is one attended with many difficulties, and it is dealt with under the heading of "Demonstration" in Section VI of this report.

A.—CROPS.

(a) Paddy.

29. Paddy is the most important crop in the Presidency, not only because it is the main staple food of the population, but because it covers the largest area, viz., 10,870,240 acres. At the Paddy Breeding Station, Coimbatore, the rainfall was

normal, but of unusual distribution with a threatened drought in August, followed by heavy rains in November and December, which interfered with the harvest. No appreciable damage was done, but the neighbouring ryots suffered considerably. The work on this main station consists of two kinds, (1) economic, the multiplication and trial of improved strains by selection, this being of primary value in breeding work, and (2) academic, the study of the mechanism of inheritance of characters along Mendelian lines. This latter work is of great importance because it leads to the production of special strains to suit special localities and markets. As a general principle the academic work is confined to the Coimbatore staff. The work implies a sound knowledge of genetics in the officer in charge of it and it cannot be done by any one except a highly trained man. For this reason it was found impossible to replace Mr. Parnell by any one in India, and Mr. R. O. Iliffe, M.A., F.L.S., a young officer with previous experience in Ceylon, was recruited in England and arrived here on 29th November to take charge of the work under a short term agreement of five years' duration. He has been designated Paddy Specialist and will devote himself entirely to paddy work. In the meanwhile it is proposed to send M.R.Ry. K. Ramayya Avargal, the Senior Assistant, on deputation to Cambridge to receive a thorough training in genetics in order that he may take Mr. Iliffe's place at the end of his agreement.

30. *Economic Work.*—Of the strains which have been evolved G.E.B. 24 holds pride of place as regards popularity and extent of cropping area. Reports of its success in new tracts are constantly being received, among which may be noted the Periyar tract, Attur and Darmapuri taluks of the Salem district, Central and Western Gōdāvari, and parts of Vizagapatam and South Kanara. A large area in the Madras Circle is cropped with Nellore samba and there is little doubt that this is really G.E.B. 24 which was introduced a few years ago. On the Central Farm at Coimbatore this strain yielded nearly 5,000 lb. of grain per acre this year. Another strain, known as Co. 1, produces a still bigger yield but it is not so widely favoured. Strain Co. 2 continues to spread in the Bellary, Tanjore, and Trichinopoly circles. It is of shorter duration than the local "Sadai samba." In the neighbourhood of Coimbatore little else is grown by the ryots than G.E.B. 24 and Co. 3.

The area at our command is quite inadequate to meet the demands for seed of these improved strains, but 20,422 lb. of seed were distributed from the breeding station, and 17,363 lb. from the Central Farm where bulk crops are grown.

Two new strains, "Gobi Anaikomban" which has exceeded the original standard by 11.6 per cent of grain for three years in succession, and a strain of "Chinna samba" which shows an increase of 12.3 per cent over the same period, have been evolved and can now be issued to the ryots under departmental supervision.

31. *Aduturai Station.*—The paddy breeding station established at Aduturai in 1922 has become very popular with the ryots. Here there was an excellent growing season, but untimely rains later vitiated the harvest. Seven strains have been issued to the ryots from this station and others are under trial. A. 1, a red "Sirumani," is in great demand in the eastern half of the delta and is rapidly replacing the local "Kattaisamba" which is subject to "blast" disease. It is estimated that 133,258 acres are under this strain, which gives on the average a yield of 16 per cent more than the local variety. A. 3 is a short duration "Kuruval" popular in the Trichinopoly district. A. 5, a "Nellore samba," is in demand in the western half of the delta and gives 25 per cent more yield than the local strain, but the ryots do not like it because it has a large-sized grain. It is estimated that at least 221,659 acres are under improved strains of paddy in the Tanjore and Trichinopoly districts. The demand for seed is far bigger than can be dealt with, 52,869 lb. only being available this year sufficient to sow 1,726 acres.

A Conference of Mirasidars was held at this station in January to enable them to see what is being done and to exchange views with the officers of the Department and discuss agricultural improvements generally with them. A similar conference was held in 1924 and it has proved so popular and was so well attended this year that an attempt will be made to make it an annual event and to organize similar conferences at other stations.

32. *Maruteru Station.*—In order to evolve strains specially suited to the Kistna-Gōdāvari deltas, some 50 acres of land in the village of Nēggipudi near Maruteru have been acquired. The land was handed over to us on 21st July 1925 and despite the lateness of the season a crop was raised

and selection work begun with the four important first-crop varieties grown in the deltas. Single plant selections are being made with "Garikasannavari" with the object of shortening its duration. The necessary buildings are being constructed as rapidly as possible and good progress has been made with them.

33. *Pattambi Station*.—In order to serve Malabar and South Kanara, a site for a paddy breeding station has been selected at Pattambi. The money voted for this station this year had to lapse as the acquisition could not be carried out in time, but it is hoped to obtain possession of the land in June-July.

34. *Economic Work*.—The cultural side of paddy growing is also being studied at these stations as far as available space will allow. Some of the problems under investigation are—

(1) The optimum spacing distance for the different strains evolved. This has an important bearing on economic planting. By adopting bunch planting wide spacing can be made to pay, and the best return with G.E.B. 24 is given by planting a bunch of four seedlings every foot. The number of seedlings per unit area must not be lost sight of however.

(2) Overcrowding of plants appears to have the effect of increasing both the length of the awn and the number of awned grains. Varieties previously considered awnless produce awns when overcrowded.

(3) The best time for sowing and the effects of early and late planting on productivity.

(4) The effect on productivity of using dry nurseries for transplant seedlings. This is an evident advantage in times of precarious rainfall and it would appear that it has no deleterious effect on the subsequent yield.

35. At the *Samalkota Experiment Station*, it has been found that early and medium duration varieties respond to single planting better than late varieties. Problems connected with the intermediate season cropping are being attacked along three main lines,

(1) the extent to which different varieties withstand an adverse season and the attack of stem-borer,

(2) the effect of broadcasting as compared with transplanting, and

(3) the extent to which pests can be controlled by extending the seed-bed period.

A broadcasted crop appears to be the least affected by disease and this promises good results. The stem-borer moth prefers a newly transplanted crop for egg-laying. The moths emerge in the early season and continue in intensity up to the end of November when there is a decline corresponding with the clear weather. If, therefore, the seed-bed period is prolonged and transplantation delayed till December, there is a chance of avoiding the pest.

36. *Academic Work*.—A number of heritable characters have been investigated and twenty-one artificial crosses have been made at Coimbatore. Studies of the root system of paddy have been begun which will throw light upon the drought resistance of the different varieties, while the cause of lodging has also been taken up for intensive study. Judicious hybridization makes it possible to reduce the duration of a particular variety by two or three weeks without reduction of yield, and several strains selected in this way are under trial. The possibilities of hybridization are enormous and experiments are in progress to study such problems as length of panicle, number of grains per panicle, number of tillers, grain colours and characters.

The genetic characters which contribute towards yield and disease resistance are also being studied. Search is being made for strains resistant to "blast" (*Piricularia oryzae*) but little success has so far been obtained.

37. At the *Samalkota Experiment Station*, G.E.B. 24 and Co. 1 have been compared and the latter gave an increased yield of 14 per cent which is significant. Varietal tests with second-crop paddies have again shown the superiority of "Garikasannavari" and "Punasa Atragada."

38. At the *Anakāpalle Experiment Station*, work is being concentrated upon two varieties, "Mypali" and "Bangaruthaga." The latter is an early paddy grown on some 75 per cent of the wet land area in the southern taluks. It is badly mixed and so there are great possibilities of improving it. Isolation of pure lines of the former will give the ryot in many villages a type of paddy which is growing in popularity.

39. *Manurial Experiments* to test the efficacy of nitrate of soda and to determine a point where it may economically replace a green dressing in areas where the latter is difficult to obtain, have been continued both at Coimbatore and Aduturai. Under Coimbatore conditions,

the cheaper green leaf is the more economical and the yield does not appear to be improved by the addition of nitrate. At Aduturai, the results so far obtained are contradictory and the work will be continued, certain alterations being made in the plan of the experiments designed to obtain answers to obscure points.

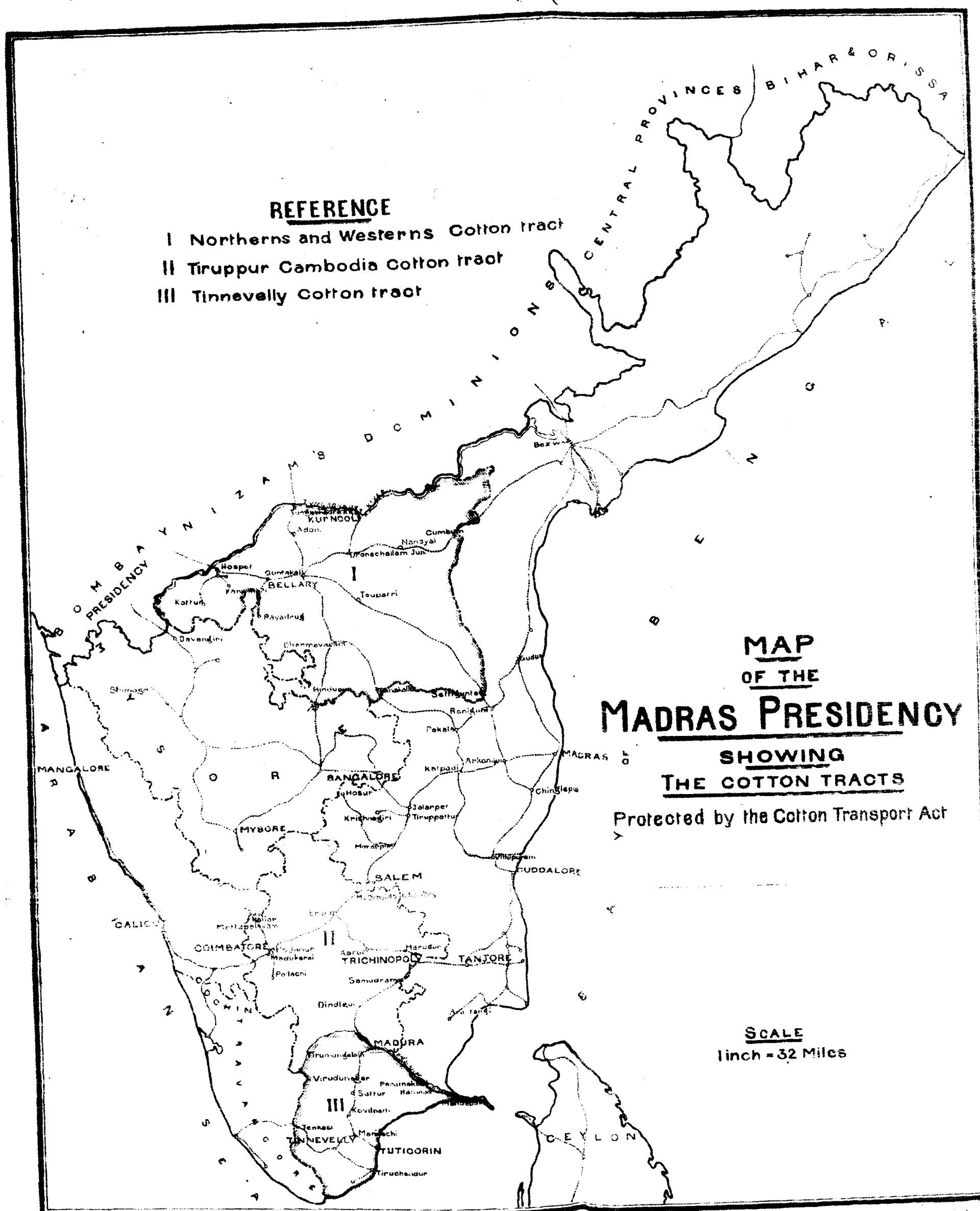
40. At the *Samalkota Experiment Station*, manurial experiments conducted over a period of five years have established the fact that on good land the use of green manure and bone meal is of doubtful value, but on poor land this manurial system results in handsome profits. The use of fish guano does not pay on either type of land. These results have been confirmed on ryots' land and may be looked upon as definite and final.

41. *Finance*.—Though of course these paddy breeding stations are not intended from the very nature of the work to pay, except adding to the wealth of the country in the value they add to the paddy crop in general, from which point of view they pay enormously, still it is worthy of note that the receipts from sale of seed amounted during the year to a total of Rs. 11,458-7-1.

(b) *Cotton*.

42. Mr. R. C. Broadfoot was in charge of this section throughout the year. The area under cotton during the year was 2,865,631 acres, and as with paddy, a constant effort is being made to produce better strains by selection as well as to produce new types of cotton suited to special districts by means of hybridization. The majority of this work is done at the main breeding station situated at Coimbatore, but new strains are tried out on the experiment stations at Kōvilpatti, Hagari, Nandyal, and Guntūr. The work has now advanced to the stage where special sub-stations are needed, similar to the sub-stations established for paddy, and steps are being taken to convert the above-named experiment stations into local cotton breeding stations, at any rate in part.

43. Three strains of Cambodia cotton were tested for yield in comparative trial plots against a standard. A strain known as Co. 1 has been in the hands of the ryots for two years, and in the neighbourhood of Avanashi it has given an increased yield of 20 per cent over the standard. Spinning tests show it to be of very good quality. There are some 1,000 acres under this improved strain this year.



44. Another strain known as No. 440 is a high yielder and the most resistant to pests so far obtained. Spinning tests show that it is suitable for spinning up to 30 s. warp, and it will be put under seed-farm conditions in the coming year.

45. Work on herbaceum cottons was done and results so far obtained indicate that it should not be difficult to make a selection more uniform than district Uppams.

46. Academic work with cotton hybrids is making steady progress, and several crosses are nearing purification for the main economic characters—yield, lint length, and ginning percentage.

47. The work on the breeding station has been greatly hampered by insect pests, particularly the stem-weevil. The station is surrounded by ryots' cotton fields from which the cotton is not removed until the last moment permitted under the Pest Act and we suffer in consequence. Attention is now being devoted to the search for resistant strains, as there is so much opposition to any kind of legislation to protect the cotton from insect attack. This is likely to prove a long business, but strains like Cambodia No. 440 hold out distinct hopes of, at any rate, partial success.

48. The Indian Central Cotton Committee have accepted a scheme put forward by the Madras Government for further research work on cotton problems, particularly the study of stem-weevil, and bud and boll shedding, and have agreed to make an annual grant of Rs. 50,000 for a period of five years. The work will be begun as soon as a Physiological Botanist and a Bio-chemist have been appointed to take charge of it.

49. *Transport Act.*—A Cotton Transport Act was brought into force during the year and three main cotton tracts in the Presidency have been defined and protected. These are (1) Tiruppur Cambodia area, (2) Tinnevellies, (3) Northern and Westerns. The situation and boundaries of these tracts are indicated in the attached map. Cotton lint may not be moved from one tract into another except under special licence. The boundary limits of the Tiruppur Cambodia tract as at first proposed by the Provincial Cotton Committee had to be extended to meet trade interests. A similar Act has been in force in Bombay for two years and has already had a marked beneficial effect upon the price and purity of recognized types of cotton.

50. A certain amount of difficulty has been experienced in working the Act in this Presidency. The Tuticorin Chamber of Commerce have consistently pressed for the grant of licences to move Cambodia kapas from Dindigul, and other places in the Tiruppur Cambodia area, to the Tinnevely area, their object being to safeguard the vested interests in gins and presses at Virudhunagar and other places in the Tinnevely area. Little heed has been paid to the improvement of the cotton grown in this area, or to the interests of firms and individuals who have ginning factories in or near Dindigul. If licences are granted for kapas it will stultify the object which the Transport Act was designed to meet, because seed of poor quality cotton will be allowed into the Tinnevely area. There can be no control over the seed of imported kapas either by the Department or the firms. To argue that there is already poor quality cotton in the protected area and that therefore it does not matter if seed of more of it is brought in is fallacious. We know that cotton in the protected area is not pure, but we want to control what is there now and prevent more bad seed constantly coming in, and we can then in time, by education and demonstration, gradually eliminate or improve all the bad stuff and grow better strains. The matter has been referred to the Indian Central Cotton Committee who are in favour of granting no such licences.

51. At present the Act exercises no control over the transport of cotton by road and a good deal is moved from one protected area to another by road. In order to check this it should be possible to place guards on certain roads at points where this traffic is now taking place and gradually to draw the cordon tight, and the Act needs amending and improving to this end.

52. *Licences under the Cotton Transport Act—Single licences for import of cotton by rail*—Six hundred and eighty-three single licences and certified copies thereof were issued from the 24th November 1925 to the 31st March 1926. Three hundred and thirty-six licences related to the Tinnevely area, 327 to the Tiruppur Cambodia area, and 20 to the Northern and Westerns area. Of these, 23 related to ginned cotton, 53 to kapas, and the rest to cotton seed for cattle food. Licences are issued for kapas only in such cases where ginning facilities are not available. The table below shows the quantity of cotton seed imported under licence.

Figures in railway maunds of 82½ lb.

Name of protected area.	Export from					Total.
	Bombay Presidency.	H.E.H. the Nizam's Dominions.	Mysore.	Madras Presidency. Deccan.	Other places.	
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Tinnevely area ...	35,184	86,109	5,560	34,516	9,929	151,298
Tiruppur Cambodia area.	6,635	17,402	36,893	34,374	2,715	103,019
Northern and Westerns area (Deccan) ...	...	3,785	...	...	...	3,785
Total ...	41,819	87,296	42,453	73,890	12,644	258,112

Cotton seed was imported mainly from the following stations:—

Gadag, Hubli, Bijapur, Warangal, Raichur, Devanagere, Chialdrug, Adōni, and Bellary.

The main importing stations are mentioned below:—

Coimbatore, Tiruppur, Erode, Madura, Tinnevely, and Karūr.

Except in the beginning, licences were granted only on applications in the prescribed form in order to ensure that parties gave the undertakings against misuse of cotton.

Annual licences for import of cotton by rail.

53. The table below gives information about the licences issued up to 31st March 1926:—

Year 1925-26 (licences lapsed on 1st February 1926.)

Name of protected area.	Purpose for which licence was issued.	Number of licences issued.	Number of certified copies issued.	Remarks.
(1)	(2)	(3)	(4)	(5)
Tinnevely area ...	Mill consumption.	1	19	
	Export to ports outside India.	1	5	
Tiruppur Cambodia area.	Mill consumption.	5	148	One licence was mislaid by the party and was not therefore returned at the end of the year.

Year 1926-27 (licences will lapse on 1st February 1927).

Name of protec area.	Kind of cotton.	Purpose for which licence was issued.	Number of licences issued.	Number of certified copies issued.
(1)	(2)	(3)	(4)	(5)
Tiruppur area	Cambodia Ginned cotton.	Mill consump- tion.	4	127
Tinnevely area	Ginned cotton.	Mill consump- tion.	6	333
	Ginned cotton.	Export	9	1,160
	Cambodia kapas.	Mill consump- tion.	5	325

54. *Import of cotton by sea.*—Ten licences were issued up to the 31st March 1926, of which one was returned unused. Six thousand and twenty-eight bales were imported into Tuticorin, mainly from Karachi by Messrs. A. and F. Harvey for use in their mills.

55. *Cotton Ginning and Pressing Factories Act.*—This Act is a natural corollary of the Transport Act and it became effective during the year. No difficulty has as yet been experienced in its application, but it is as yet too early to judge of its merits. The situation is complicated by the changes which have taken place in recent years. At the end of the war most of the ginning was done by purchasing firms. Now small ginneries have sprung up in every corner of the Tinnevely area and they find plenty of work, while the big ginneries at the trade centres lie idle and many have been closed down. Small merchants have gins and set them up in remote villages. This makes ginning much more difficult to control and clean ginning is neglected and the ryots grow mixtures for which there is unfortunately a demand. The Act provides for the maintenance of proper weights by the gin owners, but has no control over those used by the dealers, and abuse is apt to creep in in compounds outside the factory premises where the kapas is bought and the Act exercises no control over the purity of the cotton bought and sold in these premises.

56. *Administration of the Act.*—The rules under section 12 of the Act came into force on the 8th August 1925, but the rules about the marking of bales only on the 1st October

1925. There was some difficulty in the beginning about getting steel letter and number punches and there was much correspondence on the subject. Cotton bales are now marked in many of the presses and, whenever default in this respect is noticed, it is brought to the notice of the owners of cotton pressing factories. Marks were allotted to every cotton pressing factory and a list of the factories with names of owners and particulars of marks allotted was published in the *Fort St. George Gazette*, dated 22nd September 1925 and 2nd February 1926, and in the *Indian Trade Journal*.

57. Rules under section 13 of the Act about registers, weights, and scales came into force on the 18th August 1925. The following officers are empowered to enter and inspect all cotton ginning and pressing factories :—

- (1) District Magistrates.
- (2) Commissioner of Labour, Madras.
- (3) Inspectors of Factories.
- (4) Director of Agriculture, Madras, and gazetted officers of the Agricultural Department in charge of circles.

Twenty-six sets of standard English weights (1 lb., 2 lb., 4 lb., 7 lb., 14 lb., 28 lb., and 56 lb.) were purchased from Messrs. W. and T. Avery, Ltd., Calcutta, at a cost of Rs. 1,025-0-9 and supplied to the officers mentioned above for use as check weights during their inspections. The form of the inspection report was standardized. Reports are being received from Inspectors of factories and gazetted officers of the Agricultural Department in charge of circles and action is taken whenever necessary to remedy the defects.

58. There are 56 pressing factories and more than 367 ginning factories in the Presidency. The provisions of the Act and rules have been brought to the notice of the owners of factories a number of times, but some of them have not yet applied for forms. Seven thousand one hundred and twenty-seven forms of the ginning register (3,347 Tamil, 3,496 Telugu, 234 Kanarese) and 2,195 forms of the pressing register (1,105 Tamil, 1,090 Telugu) were supplied to the owners of factories up to the 31st March 1926.

59. Weekly Returns of cotton pressed in the past were obtained on a voluntary basis and a return published for the Presidency. Stamped addressed forms were supplied to press owners free of cost and they filled up the forms and returned them every week. The return has now been made

obligatory under the Act. The form of the old return has been slightly altered. Under the orders of Government, printed forms of the return are supplied to press owners at cost price, after allowing for postage. Three thousand six hundred and seven forms (1,661 Tamil, 1,946 Telugu) were so supplied up to the 31st March 1926. The return relates to the seven days ending on the Friday of each week, instead of Saturday, and is sent for publication on the following Friday. The first return of cotton pressed under the Act was for the week ending 4th September 1925. It is published in the *Fort St. George Gazette*, the Supplement to the *Gazette of India*, and the *Indian Trade Journal*.

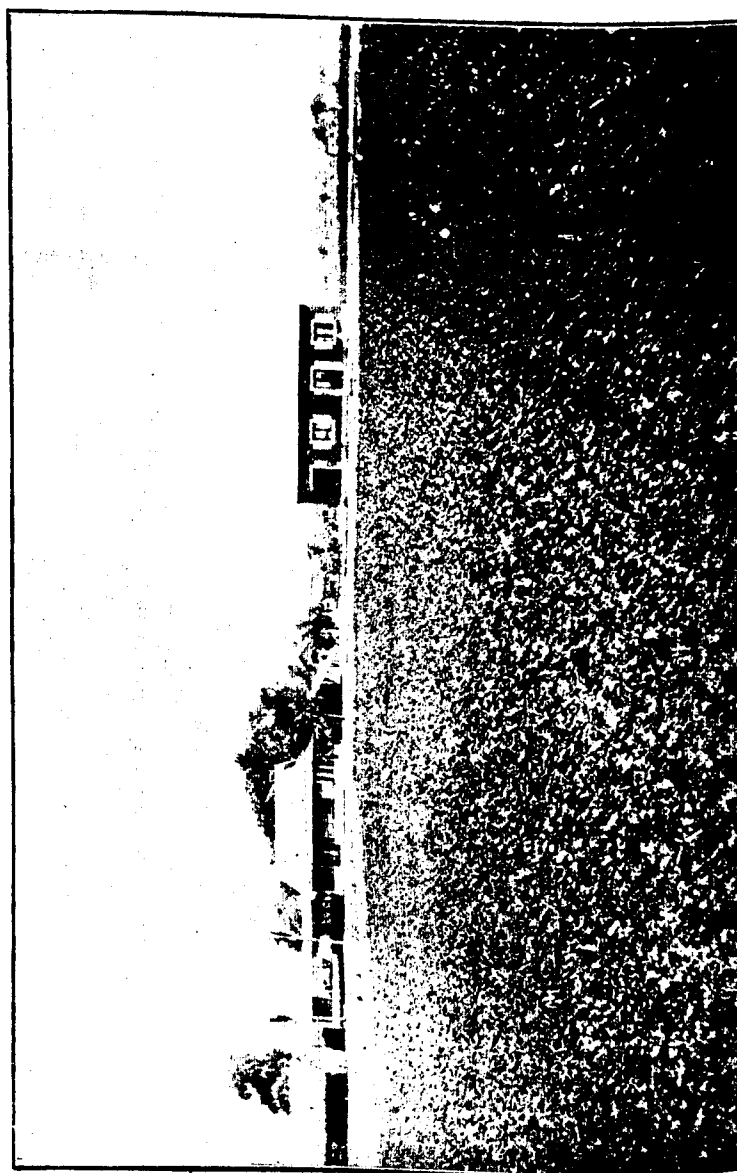
(c) *Sugarcane.*

60. The Sugarcane Breeding Station at Coimbatore has from the first been financed by the Government of India, and it is maintained chiefly for the improvement of the canes of North India. During the year, this station has been completely separated from the Research Institute and is now under the direct control of the Agricultural Adviser to the Government of India. Steps are being taken to enlarge the Experiment Station at Anakāpalle, by the acquisition of 50 acres of land to serve as a Cane Testing Station for the Presidency. Experiments conducted in past years have shown that it is quite feasible to transport either seed or young plants from Coimbatore to Anakāpalle, and fifteen seedling canes which have been transported in this way are now under trial there. In future, therefore, suitable crosses will be made at Coimbatore and the resulting seed sent to Anakāpalle where new and promising varieties will be tested out, and manurial and other experiments will be conducted.

61. A number of varieties are now under trial on the Samalkōta, Anakāpalle, and Pālūr Experiment Stations, and some of these are promising. Java varieties, on the whole, appear to be the latest to mature, followed by two Barbados varieties. Some of the Queensland canes are quite promising, but Demerara varieties have proved susceptible to disease and have been discarded.

62. Experiments conducted over three seasons at Samalkōta have proved conclusively that line planting not only saves 10 to 15 per cent of the cost of planting, but raises the yield of raw sugar by 12 to 16 per cent, and this improved method of cultivation is now being widely demonstrated to

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MILLETS BREEDING STATION, COIMBATORE.

the ryots as it tends to reduce the cost of production, a most desirable aim.

63. The cultivation of seed cane on a system adopted in Java has been the most important work undertaken at Anakāpalle during the last few years. This involves planting an early crop in February and March and allowing it to grow for six or seven months before it is cut up into setts. Results have shown that a remarkable increase in total yield and weight of individual canes is obtained with no appreciable difference in juice content. From the ryots' point of view, the value of the additional yield obtained averages out at Rs. 15 per acre, plus Rs. 10 saving in cost of seed. The yield of cane is increased on the average by 22 per cent without any additional outlay and at the same time a saving is possible in cultivation expenses. Moreover, it has been found that seed raised in this way has better germination powers and it is just possible that it is more disease resistant. Very great hopes are entertained of this system in future.

64. *Manurial.* -- An attempt has been made at Anakāpalle and Pālūr to determine the optimum nitrogen requirement of cane in various forms. An application of 15 cwt. of groundnut poonac per acre gave a profit of Rs. 60 at Anakāpalle, while at Pālūr it was found that this poonac in combination with ammonium sulphate resulted in very appreciable increases in crop.

(d) *Dry Grains.*

65. The Millets Breeding Station established in October 1923 is still in its infancy, but the equipment is, to all intents and purposes, finished. This work is in charge of M.R.Ry. G.N. Rangaswami Ayyangar Avargal, B.A. Serious work has been begun on the Sorghum group and considerable progress made with the preliminary work necessary to evolve new strains. A number of contrasted unit characters have been studied and it is hoped that these may indicate a method of attacking the *Calacoris* problem along breeding lines. Considerable progress has also been made with the study of the ragi crop and a number of single plant selections have been made and placed under comparative trial, which is the first step in the evolution of pure types and improved strains. Tenai, or korra, an important Ceded districts millet, has also been examined and material collected to provide work during the coming year for an Assistant

who will be specially deputed to this work. It will thus be seen that a good start has been made in this new section.

66. When the Anakāpalle Experiment Station was opened in 1911, one of the objects was to try and improve the ragi crop which is the staple food of the labouring classes in the Vizagapatam district. A few pure lines have been isolated and a number of promising selections have been made which include a variety introduced from Rhodesia.

(e) Coconuts.

67. The selection of seed coconuts is of the greatest importance, since it takes eight years or more for a palm to come into bearing, and it lasts for fifty years or so. There is a wide variation in characters of individual palms embracing such important items as the number, shape, and size of the nuts, and the oil content of the copra. Jack in Malaya has found as a result of experiment that each tree will retain its own individuality as long as conditions favour a fair degree of development, and that high yielding trees will remain good yielders on the average, while poor yielders continue to give a low yield. There is a very wide range of variation in fruit production per palm and this is not due to soil variations. Our results and observations at Kasaragod confirm this. As the coconut under South Indian conditions is very seldom self-fertilized, seed selection from high yielding palms is of little use in actual practice and often leads to disappointment by producing low-yielding trees. It was, therefore, decided to attempt to self-fertilize palms selected for desirable characters of growth and yield, raise the seed thus obtained to maturity, and study the inherited characters of these trees, and select good seed bearers from them. It will obviously take a long time to complete such a piece of work, but a beginning has been made at Kasaragod. A detailed description of the work was presented in a paper read at the Indian Science Congress which has been published in the Year Book for 1925.

68. Other lines of research being conducted on the Coconut Experiment Stations are manurial trials, spacing experiments, and a test to discover the optimum age of the seed mother palm.

(f) Fruit Culture.

69. At the Pomological Station, Coonoor, different varieties of fruit are being tested. Whenever varieties are

found unsuitable after a fair trial, they are uprooted and replaced by new ones. The object of this station is to determine what varieties of fruit are likely to do well in the Nilgiris, and other hill tracts, and prove profitable. With the closing of the Jam Factory, attention will have to be confined to fruit growing for table purposes. The difficulty of transporting soft fruits to a market in towns like Madras is insuperable and so special attention will be devoted in future to fruit which will withstand transport. With this object in view a block of land, formerly lent to the Industries Department for growing mulberries in connexion with their silk work and relinquished during the year, has been planted up with a number of different varieties of apples. If a good yielding apple can be found there is a prospect of finding a good market for this fruit in the big towns and competing with the Kulu trade.

70. On the whole, the fruit crops at Coonoor were good, particularly that of plums which gave a considerably heavier crop than in 1924-25, 2,743 lb. being harvested. This averages out at about 26 lb. per tree which is very good. Birds are troublesome and take a heavy toll of the fruit, but this is only to be expected as the station is situated near the bird sanctuary of Sim's Park. There was a fair demand for young stock from the nurseries, 805 grafted trees and 909 seedlings being distributed during the year, a considerable advance on the previous year. A good stock is maintained in the nurseries to meet future demands. The station has now been completely brought under a cover of green dressings, *Crotalaria*, *Indigofera endecaphylla*, and *Cassia mimosaoides* being the most notable plants used for the purpose. This system of cultivation not only preserves the surface soil on the steep slopes from loss during the monsoon rains, but supplies large quantities of organic matter, and I attribute the improved crops of recent years very largely to this cultural treatment, as very little manure is available.

71. At Burliar, a number of new plantings have been made and these should return a revenue in years to come. *Rioja sellowiana*, a newly introduced fruit, produced a few fruits and should bear well in the near future. The economics of this station are largely dependent upon the mangosteen crop. This was very heavy in 1924-25 and, as anticipated, was followed this year by a small one with consequent loss of revenue. This garden, however, is a valuable educational asset being the only one in the

Presidency where semi-tropical fruit and spice trees are under cultivation.

72. At Kallar there was a good mango crop, but there is a difficulty in harvesting this crop on account of the attack of fruit fly. This pest has been under special study at this garden and progress with its control is being made. The secret appears to be to collect and burn all the fallen fruit and keep the soil well cultivated and clean so as to destroy the breeding places of the insect. If this problem can be solved in a satisfactory manner, it will be of great help to the cultivators in the surrounding district. A Litchi received from Lucknow in 1913 is fruiting heavily in contrast to other varieties much older which have never borne. Sapodillas obtained from the same source have also borne excellent fruits and a number of plants have been grafted and distributed.

73. In accordance with G.O. No. 669, Development, dated 12th May 1923, a profit and loss account of these gardens is shown below :—

	Pomological station.		Burliar garden.		Kallar garden.	
	Expenditure.	Receipts.	Expenditure.	Receipts.	Expenditure.	Receipts.
	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.
Working charges	2,852 14 6	...	1,534 8 8	...	2,311 12 10	...
Sale of fruit	...	813 2 0	...	178 0 0	...	350 9 4
plants.	...	...	...	...	...	...
Sale of fruit	...	1,611 4 0	...	973 15 0	...	486 3 0
Miscellaneous	...	...	...	...	...	71 0 0
Total	2,852 14 6	2,434 6 0	1,534 8 8	1,161 15 0	2,311 12 10	907 12 4
Loss	...	428 8 6	...	382 9 8	...	1,404 0 6
Percentage of expenditure returned in receipts.	82.7		75		39.2	

Taking all three gardens into account, 66 per cent of the expenditure has been recovered in receipts. Last year, the receipts just covered the expenditure. The loss this year is accounted for by the poor Mangosteen crop. In a favourable season these gardens can be made to pay for themselves and it is hoped that when the newly planted trees come into

being this will always be the case. The stations have a decided economic value, as fruit growing is becoming very popular on the hills, and the stations act as a nursery for the trees required by the public, as well as an object lesson.

(g) Potatoes.

74. The study of potato cultivation on the Nanjanad Experiment Station, near Ootacamund, was continued. It has been found possible, by planting the crop across the contours, to do all the cultivation by bullock power. Ploughing is done with monsoon and turnwrest ploughs, and the clods are broken with a guntaka, a Mysore cultivator, or a Planet Junior hoe. Furrows are opened with a double mould board plough, and the seed is covered with a Planet Junior hoe drawn close together with a mould board attachment. Earthing up and weeding are also done with this implement, while a potato digger is used for harvesting the crop. By the use of these implements the cost of cultivation has been reduced to Rs. 4-4-0 per acre.

75. A number of varietal and manurial tests have been carried out and the latter tend to show that cattle manure and fish manure are the most beneficial under the conditions obtaining at Nanjanad, where the soil is very poor and lacks organic matter. At least 10 tons an acre of cattle manure is needed to produce a decent crop.

76. Other lines of research which are being carried out are experiments to determine the optimum size of setts, and the possibility of mass selection to produce hills of medium sized potatoes.

77. Diseases, especially ring disease, and potato moth are prevalent and troublesome, and experiments are being undertaken to devise methods for controlling them. It may be once more pointed out here that the station is quite unable to guarantee disease-free seed, though the greatest care is taken in the selection of the seed supplied to the public.

(h) Planters' Crops.

78. The United Planters' Association of Southern India have now established a Scientific department of their own to which Government contribute an annual grant of Rs. 28,000. Three scientific officers are employed under this scheme,

Mr. Munro, the General Scientific Officer who has been placed on foreign service for the purpose, Mr. Ashplant the Rubber Mycologist, and Dr. Shaw the Tea Expert. The department is under the control of the United Planters' Association of Southern India and no longer under the Director of Agriculture.

79. *Coffee*.—The Brazilian crop of 1924–25 was a failure, owing to bad weather during the flowering season, and there was in consequence a shortage in the world's visible supply, which caused a considerable rise in prices and stimulated export from India. The area under this crop in South India during 1924–25 was estimated of 141,929 acres of which 51 per cent are situated in Mysore State, 24 per cent in Madras, and 23 per cent in Coorg. The production was 13,605 tons, of which 12,100 tons were exported, mainly to the United Kingdom and France. The yield per acre was 303 lb. in Madras, 281 lb. in Coorg, and 201 lb. in Mysore. The average price at the end of the year under review was 144s per cwt. for A.

Great advances have been made in recent years in protecting this crop from the ravages of fungoid diseases, more especially the dreaded leaf disease, by means of spraying with Bordeaux Mixture. It is reported that in the Shevaroyes the blossom on the fields which were thus sprayed was very fine, though the rains were untimely, while on unsprayed fields the blossom was light and scattered. The results of spraying fully justified the expenditure and have proved that a coffee bush which is protected from leaf disease, and thus enabled to retain its leaves, is not so liable to run to flush or form blind eyes with the advent of untimely rain.

80. *Tea*.—There has probably never been such a strong and sustained demand for fine tea as has been experienced during the past year. Consumers have learned to recognize and demand good quality and there is little sale for really poor grades, so that coarse plucking has become unprofitable. Most companies have made a good profit and have put their estates into good order and built up a reserve. The exports of tea from South India during the year was 43,867,320 from 98,800 acres, of which Madras produced about 43 per cent. At the end of the year under review the average price of tea was 1s. 10d. per lb.

A new experiment station for the study of this crop is being opened in the Nilgiri-Wynaad.

81. *Rubber*.—The year 1925 was a most eventful one in the history of rubber. Big fluctuations in price were experienced, the minimum being 1s. 4½d. on 4th February and the maximum 4s. 8d. on 9th December. Since the introduction of the Stephenson restriction scheme three years ago stocks totalling 150,000 tons have been used up and the scheme has proved a great success. Automatic releases of 10 per cent each quarter took effect, bringing the average export quota for the year to 67 per cent. of the standard production.

The United States of America accounted for nearly 70 per cent of the total world consumption. The quota was raised to 100 per cent on 1st February 1926, and the standard production to a maximum of 500 lb. per acre. The total world consumption for 1926 is estimated at 603,000 tons.

The spraying of Hevea with Bordeaux Mixture as a protection against *Phytophthora*, the fungus which causes the secondary leaf-fall, has now become a general practice under the advice and guidance of the Rubber Mycologist, and the majority of estates spray some areas at least. The success of the method depends to a great extent upon the type of sprayer used, and though the ideal machine for the purpose still remains to be invented, great advances have been made of late.

(i) *Fodder Crops*.

82. The question of fodder to tide over the hot weather period is a difficult one. The ryot naturally refuses to put land, which will give him a substantial profit under tobacco or cotton, down to fodder, and in some places the spread of money crops of this nature is ousting fodder. It must be admitted that the Department has not paid as much attention in the past to this problem as it has to other problems, but with the expansion of its cattle breeding work the time has come when it must be tackled.

83. It is complicated by the results of the researches of the Imperial Physiological Chemist at Bangalore, who has recently shown, as a result of work carried out at Hosūr, that cattle will only eat spear grass hay enough to maintain themselves and not enough to put on growth. On the other hand they will eat silage and grow on it. One solution of the difficulty, therefore, appears to be the making of silage on a large scale from crops like cholam, sunflower, or cane shoots, which can be grown in plenty in the monsoon. It has been found that while silage cannot be made satisfactorily in

towers in India, good material can be produced in pits, provided that these are so placed as not to be water-logged in the rains. Excellent silage has been made in this way at Hosūr and steps will be taken during the coming year to prepare pit silage on all the Experiment Stations and endeavour to induce the ryots to take it up.

84. The spear grass problem will be studied at Hosūr along the following lines. Silage will be made early and the spear grass will be cut twice, if possible, so as to produce hay before it flowers. Attempts will also be made to replace spear grass on the soils which hold moisture, by means of ploughing and sowing grass seed of varieties collected locally and introduced. This research may throw light on the problem of improving the quality, from a feeding point of view, of South India fodder grasses.

85. It is also possible that Forest Panchayats may be induced to take up the growing of fodder in the rains and the making of silage and this possibility is being investigated in collaboration with the Panchayat Officer.

(j) *Miscellaneous Crops.*

86. *Betel Vine.*—About the year 1911, complaints were received about a disease which had appeared in the Betel Vines around Coimbatore. This disease was somewhat mysterious and Dr. Barber, who first investigated it, put it down to unfavourable soil conditions such as water-logging. The ryots were not content with this explanation and they attributed the trouble to the presence of earth-worms in large numbers. Further investigation showed the presence of nematodes on the roots and of fungi on the leaves. The department are still of the opinion that the cause of the trouble is due to unfavourable soil conditions, but it was found very difficult to conduct any systematic experiments on the gardens themselves, and in some cases objections were raised to officers entering these gardens. It was, therefore, decided to start a small Experiment Station to study the problem and this has now been done at Vellalore near Coimbatore. On this station the effect of systematic rotation of crops and adequate drainage are being investigated, and the work has been placed under the combined control of the agricultural chemist, and the mycological and entomological experts in co-operation with the Deputy Director. It is as yet too early to judge of any results obtained as the garden has only recently been planted up.

B.—CHEMISTRY.

87. The Chemical Section was in charge of M.R.Ry. B. Viswanath Garu, F.I.C., throughout the year. A great deal of the work of this section consists in making analyses in connexion with the field research going on at the experiment stations, and of soil and manure analyses for the public. One thousand three hundred and thirty-five samples were analysed during the year, forty-two being submitted by ryots. The latter do not take as much advantage of the section as they might, but they are slowly beginning to realize its value. This work is of the utmost importance and the success of the field experiments conducted upon the experiment stations, on which demonstration work is ultimately based, depends upon the accurate and rapid analysis of the manures applied and the crop raised.

88. On the purely research side the most important items of investigation were the following:—

(a) *Soil Survey.*—The soil survey of the northern taluks of Malabar has been completed and is now ready for publication. The whole of the tract is well supplied with nitrogen, but it is very deficient in lime and phosphoric acid, the latter being particularly wanting in the coastal areas.

(b) *Manurial investigations.*—The tendency is for indigenous manures like fish, bones, and oil-cakes to rise in price year by year due to the demand for them in Ceylon and Europe. They have now reached a price at which the ryot is unable to use them economically for his low priced crops. The attention of the department has, therefore, been turned to the investigation of other manures by which these may be replaced. *Calcium cyanamide* has received a good deal of attention since there is a possibility of making this in large quantities by means of the hydro-electric power which is being developed in the Presidency. The results of the past three years' work on this subject have shown that, at Coimbatore, the application of one cwt. of cyanamide in conjunction with one and a half cwt. of superphosphate to paddy results in a net profit of Rs. 31 per acre, and that it does not pay to increase the dose of cyanamide. For crops like ragi and cumbu, however, it is not economical to use this fertilizer at its present price of Rs. 180 per ton. The department now proposes to turn its attention to the suitability of cyanamide in conjunction with green manure and cattle manure. *Sodium nitrate* is another possible source of nitrogen. Our investigations indicate that

from the ryots' point of view green leaf manure is more profitable than either sodium nitrate alone, or in conjunction with green manure, and the prospects for the economical use of this fertilizer appear to be limited. Field experiments with *Trichinopoly phosphate* have given promising results, and this work will be continued to discover the best combination in which to use this indigenous source of phosphate. The best manure to use, however, is cattle manure. The difficulty is to get enough of it and it is of the greatest importance that the existing supplies should be stored under conditions which cause the least loss of nitrogen. Experiments to this end have been conducted over a period of three years and the results prove most conclusively that the box system is the best, both from the point of view of accumulation of manure, and its immediate and residual effect on the crop. This method of making and preserving farm yard manure is now being demonstrated to the ryots, but it is not popular as there is an idea that the animals lose condition. Fortnightly weighings of animals during the course of our experiments conducted over a period of three years, however, have shown that they actually gain in weight. In order to try and supplement the supply of farm yard manure investigations have been made with the *synthetic product* and considerable additions to our knowledge of this subject have been gained. It has been found that there is no need to employ expensive starters like "adco," ammonium sulphate, or cyanamide, but that a little cattle urine is quite sufficient, or where this is not available crude ammonium chloride can take its place. We are now within reach of producing synthetic farm yard manure from straw, and such waste products as groundnut husk and prickly-pear, and it is hoped soon to be able to devise a simple method which can be demonstrated to the ryots.

(c) *The effect of manuring a crop on the vitality and nutritive value of the seed.*—Work reported under this head in previous years was continued and former results have been confirmed with a variety of crops. Lt.-Col. R. McCarrison, C.I.E., I.M.S., has kindly conducted feeding tests for us and he reports that wheat obtained from a plot which received cattle manure was 15 per cent more nutritious than wheat produced from a plot manured with artificials. These results are of the most far-reaching importance and they emphasize the great necessity that exists for organic manure and explode the theory sometimes advanced that the drain of organic

manures like oil-cake and fish to outside countries can be replaced by the use of artificial fertilizers like nitrate of soda and ammonium sulphate. The soil must be manured for three reasons, (i) to obtain increased yields, (ii) to obtain seed which will yield a vigorous crop in the next generation and (iii) to secure a better nutritive value of the crop, and our work has proved that it is necessary to use organic manures to attain these desiderata.

89. The accumulated researches of the Agricultural Chemists, from Dr. Harrison onwards, point to the fact that the solution of the manurial problem appears to lie along the following lines:—

- (a) The proper preservation of all cattle dung available and the use of this combined with artificials.
- (b) The control as far as possible of the export of organic manures like fish, oil-cakes and bones.
- (c) The manufacture of a synthetic farm yard manure from waste products like straw, groundnut husk, prickly-pear, hill grasses, etc., and
- (d) The conversion of sewage and night-soil from big towns into organic fertilizers by means of the activated sludge process.

C.—BOTANY.

90. Apart from the teaching work of this section, it is frequently called upon to identify plant materials and supply seeds and information, both by departmental officers and the general public. Several botanical expeditions have been made during the year with the object of improving our knowledge of the Flora of different areas of the Presidency.

91. It was with very deep regret that the news of the death of Mr. J. S. Gamble, C.I.E., F.R.S., was received in October last. Mr. Gamble has been engaged since 1912 in compiling the Flora of the Madras Presidency, which is very largely based on the herbarium collection at Coimbatore. Seven parts of this Flora, covering the orders *Ranunculaceae* to *Euphorbiaceae*, have been published, the last part posthumously. It is understood that arrangements have been made at Kew to complete this valuable work.

92. A systematic study and description of the weeds of the Presidency is being prepared by this section and will shortly be ready for publication.

93. A new species of *Pavonia*—*P. cozii*, *Tad. et Jacob*—was described during the year and published.

94. The section is responsible for the upkeep of the Botanic Gardens at Coimbatore, and the avenues planted on the estate. These have been kept in excellent order during the year and have added a great deal to the general beauty of the estate as a whole. The Botanic Gardens, started by Dr. Barber when the College was first built, have of late years been somewhat neglected, but they have now been restored to their former beauty. These gardens not only serve the purpose of teaching students the rudiments of horticulture, as well as botany, but they are a popular resort of the public from the town of Coimbatore and they are an attractive feature of the College.

D.—MYCOLOGY.

95. In order to understand a fungoid disease which may attack a crop, it is necessary, first of all, to determine by a careful microscopical examination of the affected plant, which may involve sectioning it, what organism is present and exactly how it affects the plant. When this has been done the fungus must be isolated and brought into pure culture by growing it in various media under controlled conditions. It must then be inoculated into plants grown under sterile conditions, which we know to be disease free, to see if it produces the same symptoms, and if it does, the same fungus must be recovered from these controlled plants in pure culture again. Only then can we be sure that any particular fungus is the real causative agent of any particular disease.

96. During the course of this research, a cure or a preventative measure may or may not have suggested itself, an attack being made on the fungus at a weak point. Then and then only are we in a position to suggest and demonstrate a cure.

97. Such are the broad lines of research undertaken by the Mycological section, and during the year a number of important fungoid pests have been subjected to study. Among these may be mentioned, *Piricularia*, the fungus which produces "paddy blast." One important fact has been discovered about this fungus, viz., that its spores retain their vitality on the straw seven months after harvest, which indicates how it carries over from crop to crop. An

attempt is being made to combat this disease with the help of the plant breeder and to produce varieties which are resistant to it, and there are hopeful indications that this can be done.

98. The "mosaic" disease of sugarcane has made its appearance in this Presidency for the first time during the year. This is an obscure disease caused by a virus too small to be seen. Every possible attempt is being made to control its spread, and steps are being taken to advise the ryots to destroy it whenever it is seen and to plant setts obtained from cane known to be free from it. The study of different varieties of cane with reference to their susceptibility to mosaic is also being undertaken.

99. A large number of other fungoid diseases are under investigation and our knowledge of them is steadily, if slowly, advancing.

E.—ENTOMOLOGY.

100. As in the case of fungi, so in the case of insect pests, it is necessary first of all to make a careful and detailed study of the insect and its life-history before a remedy can be suggested. For this purpose the insect must be bred in captivity in the Insectary and the period of time occupied in its various metamorphoses ascertained, the food plants it can utilize, and the positions in the soil or on the plant which it occupies. In addition to this, it is necessary to study its relations to other insects, more particularly its parasites, since sometimes use can be made of these for its control. The research work of the Entomological section is directed to these ends and every insect pest known to attack crops in the Presidency is under study and observation.

101. Special mention may be made of the work done on *Schænobius*, the paddy-stem borer, which has revealed the fact that the insect rests either in the stubble or in the stems of wild paddy during the hot season, and in years of rainfall in summer large numbers survive to infest the new crop. Experience has shown that the moths at the time of egg laying select a crop which has just established itself after transplantation. This suggests that a partial solution of the problem may be found in delaying transplantation till the weather clears, which coincides with the emergence of smaller broods.

102. *Nephantis* is a caterpillar which attacks the leaves of coconuts and which has been introduced on the West Coast with disastrous results. Considerable progress has been made with the control of this pest by means of its parasites.

F.—HORTICULTURE.

103. In accordance with G.O. Mis. No. 1049, dated the 9th August 1922, an account of the Government Botanic Gardens is included in this report. These gardens, both at Ootacamund and at Sim's Park, Coonoor, are of historic interest and very popular places of resort for all classes of people, especially Indians. They contain a valuable collection of trees and plants and compare favourably with any gardens in the east. A practice has been regularly adopted of calling attention to any tree or plant of particular interest which may be in flower, and indicating where it can be found, by means of a short paragraph in the local press, and this has proved popular.

104. Special features during the year were displays of Daffodils, which were flowered in pots in the conservatory, basket and tuberous Begonias in all shades of colour, and of white Hydrangeas. Out of doors the most striking flowers were a collection of more than a thousand Gladioli which came into bloom in August. These were raised from seed for the first time and they attracted a lot of attention. Among the noteworthy plants which flowered for the first time was a small tree of *Magnolia Campbellii*, a native of the Himalayas planted in 1906.

105. In the nurseries, which were kept well stocked and from which the public demand for plants is supplied, several new and rare plants were propagated, notably seedlings of *Luculia pinceana* obtained from trees growing in the gardens by means of artificial cross fertilization, and *Anemone japonica* imported in 1922.

106. My thanks are due to all those who have kindly presented plants and seeds to the gardens during the year. Many of these are most valuable additions to our collection.

107. In addition to these gardens the Curator, Mr. F. H. Butcher, is in charge of what are known as "Government Parks," scattered lands including Stone House Park, Post Office Hill, Church Hill Park, Jail Hill, and the Lake Margins. St. Thomas's Cemetery is also under

his charge, though funds for its upkeep are found by the Ecclesiastical Department. These parks take up a great deal of his time and their maintenance in a clean and tidy state adds much to the beauty of Ootacamund.

108. The following is a statement of the expenditure and receipts for the official year under report:—

	Government Gardens, Ootacamund.		Sim's Park, Coonoor.	
	Expenditure.	Receipts.	Expenditure.	Receipts.
	RS. A. P.	RS. A. P.	RS. A. P.	RS. A. P.
Salaries and allowances.	15,133 14 0	...	932 4 0	...
Working expenses ..	15,035 8 11	...	8,555 8 10	...
Contingencies ..	503 11 7	...	32 3 0	...
Sale of seeds and plants.	...	2,862 3 9	...	1,647 7 8
Sale of flowers ..	...	1,693 0 0	...	258 4 0
Sale of catalogues, etc.	...	36 3 0	...	61 10 0
Sale of medicinal plants.	...	109 5 0	...	...
Miscellaneous *	...	748 0 6	...	160 4 0
Total	30,673 2 6	5,449 12 3	4,589 15 10	2,127 9 8

* Includes rent of rest-house at Sim's Park, Pound Fees, hire of plants and work done for private institutions.

The percentage of expenditure recovered in receipts, 21.5 per cent.

It is not quite fair, however, to charge the whole of the Curator's salary to the Gardens as he also has charge of "Government Parks", and during the coming year a further economy will be effected, since he has now been given charge of the Potato Experiment Station at Nanjanad and the demonstration work with potatoes and fruit in the Nilgiris.

109. *Medicinal plants*.—Last year, 1,700 lb. of *Jalap* was harvested, 1,500 lb. of which were reserved for the Medical Stores. This Department, however, delayed so long in taking it that, in spite of an attempt at sun drying, most of the tubers went bad. It would appear that this product should be kiln dried after harvest if it is to be kept for any length of time.

110. *Ipecacuanha*, grows well at Kallar till the rains set in, when many of the plants die becoming attacked by a fungus. The effect of spraying is being tried and the stock

is being multiplied with the ultimate aim of supplying the Medical Stores with their requirements.

111. Doubt has been thrown in the past on the therapeutic value of *Digitalis* grown on the Nilgiris. A fresh sample sent to the Calcutta School of Tropical Medicine for examination has elicited the fact that it is probably not so active as the standard. This needs confirmation, however, by medical men by actual trial on patients. Trials with *Barosma betulina*, and *Uncaria gambier*, both resulted in failure.

G.—GENERAL INVESTIGATIONS.

112. The policy laid down in my Administration report for 1923-24, of close co-operation between not only the separate sections of the department itself, but with other departments of Government, has been adhered to and help has been rendered to a number of other departments during the year. One of the most interesting examples of this has been the case of *ganja* which has been investigated for the Excise Department. Our investigation of the problem has shown that the deterioration of *ganja* on storage is due largely, if not entirely, to the methods adopted, and that every stage between cultivation, manufacture, and storage is in need of improvement and control, and that the botany and chemistry of the plant need intensive study. Steps are being taken by the Excise Commissioner to adopt our suggestions and we look forward next year to conducting, in co-operation with him, an intensive study of the problem which should prove of the greatest interest and use.

113. Another important instance of co-operation is the work on the nutritive value of food grains which has been carried out in collaboration with Lt.-Col. McCarrison, C.I.E., who is engaged upon the Deficiency Diseases Enquiry at Coonoor. Reference has been made to this work above. Further help is now being given to Col. McCarrison in the estimation of the iodine content of South Indian soils.

114. Land was examined and reported upon for the Chief Engineer for Irrigation in connexion with hydro-electric schemes.

115. Reports on samples received from the Superintendents of the Central Jails at Bellary and Coimbatore; the touring Veterinary Assistant Surgeon, Ootacamund; the Executive Engineer, Nellore; the Inspector of Excise, Arni; and the Research Assistant at Tanur fisheries, were made.

116. A series of eight lectures and two practical lessons in elementary agriculture were given to the summer school of the Y.M.C.A. at Ramanathapuram, Coimbatore.

V.—LIVE-STOCK.

117. The Live-stock section in charge of Mr. R. W. Littlewood has now become a very large and important part of the work of the department. Four cattle farms are maintained. The largest is at Hosūr and consists of 1,600 acres taken over from the Military department last year. It lies on the Hosūr-Denkanikōta road some four miles south of Hosūr and 28 miles from Bangalore. This station dates from 1828, when it was established as a military remount depot, and is thus of historic interest. At Chintaladevi a farm is maintained for the study of the Ongole breed. At Guntūr there is a small farm devoted to the study of buffaloes. At Coimbatore a milch herd is maintained supported by a model dairy for teaching purposes.

118. *Cross-breeding*.—Two herds are maintained for this purpose. The "*Bangalore herd*" consisting of half-breds, an Ayrshire pedigree bull being used on Scind and Montgomery cows, and the "*Coimbatore Herd*," a mixed herd of cross-breds selected from the old college dairy herd at Coimbatore. This herd contains Ayrshires, Shorthorns, and Jersey crosses of various degrees. Scind and Montgomery country bulls are being used on these cows and in the case of quarter-bred animals a half-bred Ayrshire bull.

119. *The Bangalore herd* is divided between Coimbatore and Hosūr and contains 83 animals. Their constitution is not strong and the death rate is on the high side, but the second generation bulls and heifers are a good lot. The best milkers are transferred periodically to Coimbatore to serve the college dairy. During the year, there were on the average 13.9 cows in milk with an average of 14.3 lb. of milk per cow per day. One of the best first generation cows in this herd has yielded over 8,000 lb. of milk during the year; she has calved twice, and is now giving 24 lb. of milk a day. A daughter of hers has given 3,737 lb. of milk in one lactation, with a daily average of 12.5 lb. and in her second lactation, which is not yet complete, she has reached 3,521 lb. with a daily average of 16.5 lb. Five cows out of twelve have given 6,000 lb. of milk in one lactation. In the second generation, eighteen cows have calved and these have averaged 2,500 lb. of milk

with a daily average of 12.3 lb. They are still in milk and it is too early to pass final judgment on them: two or three will certainly reach 4,000 lb. for their lactation period, however. They will probably do better still in later lactations.

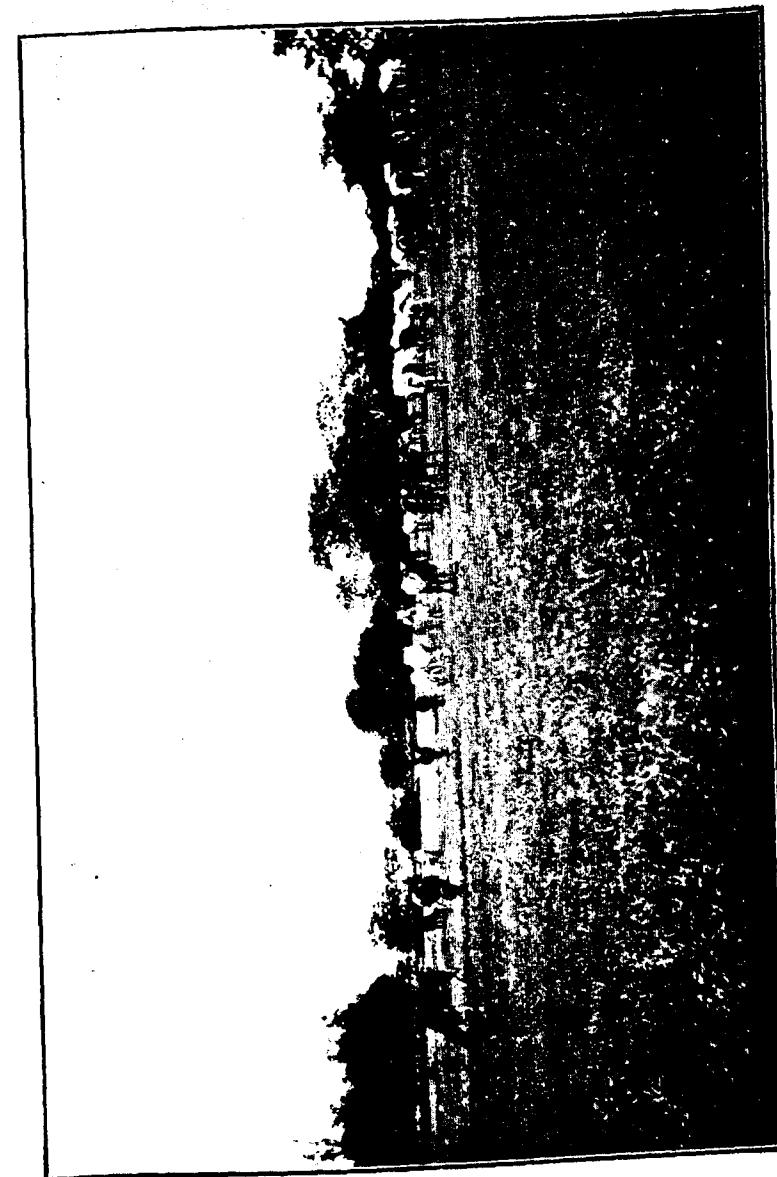
These yields may be compared with those obtained in England which show the great possibilities which exist. "Maud," a Lincoln Red cow, in her third lactation gave 11,600 lb. of milk with a maximum daily yield of 57 lb. She was dry for 59 days and in her next lactation, her fourth calf, she gave as much as 109 lb. of milk in one day. Much of this is due to good feeding, but this alone will not ensure high yields for each and every cow. Some will decline in yield at the end of the second or third week of their lactation and run to fat. Others continue to rise in yield in response to additional nutriment until they reach a maximum of five to seven gallons a day. It is by discovering such cows and breeding from them that the high herd averages of England and other countries are obtained, and we are endeavouring to follow similar lines of development at Hosūr.

120. *The Coimbatore herd* contains 88 animals. At Coimbatore, 11.3 cows on the average were in milk during the year with a daily average of 12.3 lb. of milk per cow. The best cows in this herd have given 6,300 lb. and 5,715 lb. of milk per lactation respectively, and several of the first calvers are very good milkers.

121. *The Ongole herd* maintained at Chintaladevi and Hosūr now contains 95 animals. Those at Hosūr are in excellent condition. There were 13.4 cows on the average in milk throughout the year with a daily average of 11.14 lb. of milk per cow, which is very good for this breed. The best cow has yielded 3,610 lb. of milk in 277 days, with a daily average of 13 lb., and she is still giving 10 lb. of milk a day. Her maximum yield was 27 lb. in one day. There is every prospect of building up a good Ongole dairy herd on these farms.

122. *The Scind herd* contains 70 animals, among which are some very promising young bulls, and it is hoped to place one or two of these at stud on the West Coast during the coming year.

123. *The Montgomery herd* contains 12 animals. The bulls are used for crossing the cross-bred heifers in the Coimbatore herd, the progeny of the Ayrshire bull "Knight-hood."



CENTRAL CATTLE FARM, HOSUR--CROSSBRED HERD.

124. *The Kangayam herd* is one of the best looking herds at Hosūr, where the breed thrives very well. Three young bulls from this herd have been selected by the Kangundi Cattle Breeders' Association for stud purposes.

125. Owing to outbreaks of foot and mouth disease, the number of services performed by Government stud bulls for ryots and milkmen is less than last year, and amounted to 900. Three hundred and thirty-eight of these services were performed at Madras, and three hundred and ninety-five at Coimbatore.

126. Twenty-one animals have been sold from the Government farms during the year for Rs. 2,032. Sales from the Chintaladevi farm were interfered with by an outbreak of foot and mouth disease.

127. *The Buffalo herd* at Guntūr contains 42 animals. The milk yields are improving, and the best animal gave 4,897 lb. of milk with a daily average of 14.2 lb.

128. *The Coimbatore dairy.*—The daily average yield of the dairy herd at Coimbatore was raised by 1.3 lb. during the year, and 150,978 lb. of milk were produced as compared with 132,343 lb. last year. During the last two years there has been an increase in the outturn of milk which amounts to nearly 2,000 lb. a month. 7,704 lb. of butter were made and sold during the year.

129. *Madras milk supply.*—Five cross-bred bulls and three buffalo bulls are kept at stud at Madras for the benefit of the milkmen, and during the year 70 calves and 58 buffalo calves were born to them. These were inspected by a demonstrator who gave advice to the owners as to rearing and feeding. Two calf shows were held during the year, under the auspices of the S.P.C.A., at which prizes were awarded by the department for the best cared for calves born to the Government bulls. This is done to encourage the milkmen to feed their calves better and on the whole there are signs that this is being done, though there is still room for a great deal of improvement.

130. Experiments have been conducted at Hosūr on the keeping qualities of milk with the idea of transporting it to Bangalore or Madras. The results have shown that in order to do this it will be necessary to install a pasteurising plant. If this is done, it will be quite feasible to supply good milk to Madras for hospital and other purposes.

131. Premia were given for eight bulls kept at stud at different centres during the year. The Ayrshire bull "Knighthood" had to be moved from Ootacamund on account of the danger of in-breeding, but arrangements are being made to purchase another bull of the same breed to replace him.

132. A partial survey of the Ongole cattle was made during the year, and it is hoped to complete it during the coming year. It goes to show that there are insufficient breeding bulls in the tract, and that the strength of the breed is rapidly declining.

133. *Sheep*.—The sheep, hitherto kept at Bellary, were transferred during the year to Hosūr where they are under much more healthy condition. Two flocks are maintained, one white with black faces, and one pure black. The total yield of wool was 298 lb. from 149 animals, which amounts to almost 2 lb. per sheep. This is an advance of $6\frac{1}{2}$ oz. on last year, and as the main object of breeding is to improve the quantity of the clip, it will be seen that an advance is being made in this direction.

134. *Poultry*.—A number of breeds are kept for experimental purposes at Hosūr and Coimbatore. The receipts from sales of stock and eggs amounted to Rs. 958 during the year. This is a small side line of the live-stock work to which more attention might well be paid, but the ryot has not yet learned the possibilities of poultry keeping on scientific lines as a subsidiary industry.

135. *Pigs*.—These are kept on the cattle farms as an economic method of disposing of waste cattle food and butter milk. The breeds kept are pure Berkshire and Yorkshire white. There is a ready sale for the fat pigs at Wellington and Rs. 538 were realized on them during the year.

VI.—DEMONSTRATION.

A.—OPERATIONS AGAINST DISEASE.

136. *Application of the Pest Act to Cambodia cotton*.—The Act was applied, as usual, in the taluks of Omalur, Tiruchengodu, Salem, Nāmakkal, and Rasipuram in the Salem district; Kārūr, Kulittalai, Musiri, Trichinopoly and Lalgudi in the Trichinopoly district; and the whole of the Madura district, and of the Coimbatore district, except the Kollegal taluk and a few villages in the Pollachi taluk.

137. The Act has now been amended to make it illegal to have Cambodia cotton on the ground after 31st August, and no individual notices need be given to ryots to remove it. Despite this, however, the cotton was not all removed by the prescribed date, although officers of the department did all they could at jamabandi camps and elsewhere to explain the necessity for the Act and what should be done under its provisions.

138. Actual eradication was not completed in the Coimbatore and Salem districts until the middle of September. In the Trichinopoly district, in places favoured by rain and on garden land, the cotton was not removed till the end of September. In the Madura district alone did the Act work in a satisfactory manner. Here, the ryots admit that they understand the necessity for the timely removal of the crop and see an improvement in the general health of the cotton and the quality of the crop when the plants are removed early. It is only in zamindari tracts that any trouble is experienced. The Act does not, at present, apply to the adjoining district of Rāmūād where large areas of Cambodia remain on the ground, and this naturally discourages the ryots in the adjoining villages in Madura where the ryots are forced to remove their crop and they think they are being unfairly treated.

139. It will thus be seen that in the Coimbatore, Salem, and Trichinopoly districts, the benefits which it was hoped to obtain from the timely removal of the cotton are not being gained. There appears to be a great deal of apathy in the matter, and in the Coimbatore and Salem districts cases were found of cotton still being on the ground after a nil return had been submitted. The attention of the Collectors was drawn to such cases. If the cotton is not removed even at the late date allowed under the amended Act, it will be necessary to take drastic steps to enforce the Act and punish those who do not obey it.

140. I am bound to take a pessimistic view of the present situation, and I am convinced that the final result of this inattention to the provisions of the Act and the leaving of the cotton on the ground as late as the middle of September will react unfavourably on the quality of the lint in future years, more especially when early rains are received which keep the cotton growing. This year there was a long drought which killed a good deal of the cotton and this aided its eradication. But the ryots must be compelled to

comply with the Act if any benefit whatever is to be obtained from it in its amended form, and I am still of the opinion that the date of eradication should be made much earlier, and that the operations of the Act should be extended over a wider area if any good and lasting results are to be obtained.

141. *Application of the Pest Act to palm disease in the Northern Circars.*—The palm disease, or 'bud rot', of both palmyra and coconut palms has now been proved to be due to a fungus, *Phytophthora palmivora*, Butl. It is a severe epidemic disease of palmyra palms in the Northern Circars, but can be controlled by systematic measures of cutting and burning dead palms, and examination of the trees and treatment of those attacked. In 1920, the Pest Act was applied and a special staff is employed under the Revenue Department to conduct the work. This staff is now on a permanent basis of three years which has added a great deal to its efficiency.

142. In the East Gōdāvari there has been a small decrease in the disease. Five new villages have been brought under the operation of the Act, and if the cuttings in these are deducted, the figures for 1924 and 1925 are 15,717 and 14,065 dead trees, respectively.

143. In the West Gōdāvari also there was a small decrease, the figures being 1,116 and 1,342 for 1924 and 1925, respectively.

144. In the Kistna district, there has been a marked increase of the disease which is disappointing. In 1924 only 69 dead trees were cut, but in 1925 it has been necessary to destroy 1,494 trees. It would appear that the disease increases rapidly after a cyclone, a similar experience having been met with in 1922. In 1925 all these districts were subjected to cyclones and exceptionally heavy rain and from July onwards the disease made its appearance with increased vigour.

145. The radius of the general examination has been extended from 50 to 200 yards with good effect, and 14,500 infected trees were saved during the year. With the special staff now provided for on a more permanent footing the work is being done more thoroughly than before and there is no need for alarm, though the Act will have to remain in force for some years to come.

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COCONUT CATERPILLAR. LETTERING ON C. B. A VIEW PARALLEL TO ESCAPE.

146. It is quite impossible to make a monetary estimate of the good that has been done by this campaign, but there can be little doubt that it has saved the industry. The time has not yet come, nor will it come for many years probably, when the Act can be withdrawn and the work handed over to growers. The aims of the Act, viz., to make dealing with the disease a duty and to teach the people to fight it without extraneous aid are still very far from being attained. Though the disease has been reduced, it is still dangerous, and past experience has shown that unless constant care is taken, it starts up again in places where it was hoped it had been eliminated.

147. *Application of the Pest Act to the Coconut caterpillar.*—The history of this pest during the year has been one of continuous spread from place to place along railway, roads, and waterways. This is because leaves infested with caterpillars are used for covering consignments of tiles, fish baskets, etc. It is impossible to stop this. In January, the Act was extended to operate over the whole of South Kanara. Each fresh attack is dealt with as rapidly as possible, the leaves first being cut and burned to check the pest and later parasites are introduced.

148. The success of this introduction of parasites has been very marked. Two of those introduced into the affected area have established themselves in many of the gardens round Mangalore and are slowly spreading. In order to hasten this spread, coolies are employed to convey parasitised material from place to place where it is stored in cages from which the parasites can escape, while the *Sericope* moths are retained and destroyed. One of the parasites has also been bred on a large scale in the laboratory and liberated in badly attacked localities. Other parasites from Cochin have also been bred and released. On the whole, the situation has improved under this treatment, but it is distinctly disappointing to find that the pest is spreading into new localities owing to the careless transport of infected material.

149. The only method which can be suggested to deal with this pest is to increase the staff and laboratory facilities so that parasites may be bred in very large quantities in the hope that ultimately they may establish themselves in sufficient quantities throughout the district, to hold the pest in check as is the case in other countries, where the pest is of a sporadic character. At present, each new infection is serious

because the parasites do not exist in quantity and it takes time to introduce them in sufficient numbers to become operative.

150. *Mahali disease of Arecanuts*.—The control of this disease, by means of timely spraying before the rains, is now thoroughly understood by the garden owners as a result of intensive propaganda in past years. This is reflected in the fact that there has been a very small demand for sprayers from the department during the year. In fact, this may now be looked on as a finished piece of work.

151. *Spodoptera*.—A campaign was undertaken in five taluks, Chirakkal, Kottayam, Kurumbranad, Calicut, and Ponnani, but the pest only made its appearance this year on small patches and on hill grasses. Large numbers of caterpillars were destroyed in the Ponnani taluk by flooding and sweeping and the method was demonstrated satisfactorily. Though the campaign was vitiated by the non-appearance of the pest, it had an educative value of which we hope to reap the benefit next year.

B. DEMONSTRATION PLOTS.

152. The aim and object of the research sections is to discover some improvement in the methods of local agriculture. When this has been done, the next step, after it has been thoroughly tested out on the Experiment Stations and found to be applicable to local conditions, is to teach it to the ryots. This is not an easy matter.

153. There is an idea in certain quarters that this problem of the diffusion of knowledge is a very simple one, and that all that is necessary is to send out an army of lecturers to preach improved methods to the ryots. This is far from being the case. Experience has shown that the ryot is not going to change his present methods and adopt improvements, which he looks on as largely experimental, without adequate proof that he is going to benefit; and he cannot be blamed for this attitude. Again, the ryot cannot be induced to travel even short distances to visit Agricultural Experiment Stations, and when he does pay them a visit, he is prone to think that methods are adopted on these stations which are not applicable to his land. The lectures delivered, and the leaflets distributed are often imperfectly understood by the people who hear them or try to read them, while exhibitions are more often than not attended for the sake of the *tamasha*, and do not create a lasting impression. All

such methods play their part and have their uses. But more than this is needed.

154. To quote His Excellency Lord Irwin, in a recent speech of his, "The man of Science pursues his careful and laborious research; he tests out his theories and reaches at last the point where he can show secure discoveries. But his work is incomplete until he has succeeded in transfusing his hard won knowledge into the working practice of the actual cultivator. The problem is everywhere the same, namely, how to carry scientific results to practical experience, and here it is certain that men learn most readily through the eye, and that most of us are often prepared to trust if we see that which we might distrust if we only read or hear. Cultivators who see with their eyes the proved results of new seed or new methods will become at once converts to them and missionaries of the new ideas."

155. In Madras, the plan has been adopted of establishing demonstration plots on the ryots' own lands, on which the improvements which have been tested out on Government Experiment Stations, and which are recommended by the Department, are carried out. This method has proved successful and is popular with the ryots.

156. The real success of such a demonstration depends on carrying it to a satisfactory conclusion, and getting figures of yields at harvest time and actual prices of the marketed product. A cultivation sheet is maintained by the agricultural demonstrator in charge showing the profit and loss account, but unless these final figures can be obtained the demonstration is incomplete. The ryot on whose lands the plot is situated, and his immediate neighbours, may be satisfied and judge the value of the demonstration by eye, but others who have not seen it constantly are, quite rightly, not so easily satisfied and demand figures.

157. On these plots a large number of different agricultural improvements have been demonstrated, covering economic planting of paddy and thin nurseries, the use of green manures and fertilizers like bone meal, fish guano, superphosphate, and oil-cake, the use of iron ploughs, and so on. In the cotton areas, the demonstrations are mainly concerned with new strains of seed, better methods of picking, and the use of drills for sowing; while in the sugarcane areas, special attention is devoted to line planting, propping and wrapping, the use of iron mills, and the Sindewahé furnace.

158. Five or six hundred demonstration plots were in existence on ryots' own lands during the year under report. It is not claimed that all were successful, nor could final results be obtained for all, but the majority were successful and the system is very much appreciated by the ryots who come forward readily in most places to offer land for the purpose of such demonstration.

159. In a large number of cases final monetary results have been obtained. This report is not the place in which to discuss these, but it is hoped at an early date to collect and publish a number of the results obtained. Too much stress cannot be laid on the economic and financial side of improvements which are advocated to the ryots and this aspect is always carefully borne in mind. The limiting factors of demonstration are still men and money. There is a growing demand among the people for more demonstrators, and in all Circles there are large areas which we have been unable to touch for lack of staff. It is necessary to concentrate our efforts on limited areas and not to dissipate them over a wide area. At present the jurisdiction of each demonstrator extends over two, or in some cases even more, taluks, and this is too large an area for concentrated and profitable work. The ideal which I have in view is a demonstrator for each taluk in the Presidency. The map attached to this Report indicates the areas now being attacked and the headquarter station of each demonstrator. Lack of funds prevents the demonstrator at present moving very far from his headquarters and his work is concentrated in the neighbourhood of these centres. During the year 14,571 visits have been made to villages by the demonstrators and 306 new villages have been visited for the first time.

C.—DEMONSTRATION AREAS.

160. It is sometimes demanded that the Department should run "model farms" to show the ryots that the methods they advocate are of a practical nature and that they would pay on a large scale. The Experiment Stations do not serve this purpose, nor are they designed to do so. It is practically impossible for a Government Department to undertake work of this nature; for one thing it would be difficult to adjust the salaries of the officers in charge to that of a farmer cultivating his land for a living, and for another finance rules do not permit of a rapid turn over of

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profits such as would be adopted by a business-like farmer. The challenge has not, however, been altogether neglected.

161. A demonstration area was marked out some years ago on the Samalkota Experiment Station in order to bring to the notice of ryots the results of experiments conducted on the station in a practical manner which can be easily understood. The area of this demonstration has now been increased to 7.57 acres and it is cropped in paddy, sugarcane, plantain, and pulses along the improved lines advocated by the Department. A record of yields and costs is maintained and published in the station report, the cost of supervision by the farm staff being the only item omitted. A net profit of Rs. 175 per acre was obtained during the year under review on the whole area. This is a lower figure than last year due to the low market value of jaggery and fruit.

162. In the IV Circle, three demonstration areas are conducted on somewhat different lines. Here, an attempt is made to contrast side by side local methods with those advocated by the Department in order to show the increased profit to be obtained by adopting these latter methods. Practical farming is aimed at and a profit and loss account is published, taking into account the cost of all operations. For details I would refer to the administration report of the Circle officer in charge. It is proposed to close these areas after they have been running for three or four years and to start others in new localities so that ryots in other places may benefit by them.

163. At Madukarai, Chingleput district, the following improvements are contrasted with local methods. Ploughing with an iron plough, green manuring combined with fish guano, economic transplanting of paddy raised in a thinly sown nursery, and an improved strain of paddy, as opposed to the use of a country plough, cattle manure only, and bunch planting of paddy seedlings of the local strain. On the garden lands, industrial crops such as sugarcane and groundnuts have been introduced into the rotation, and on the dry lands the use of iron ploughs and drills are contrasted with the country plough and broadcast sowing. The results have been striking and the following increases in net profit per acre over the local methods, conducted side by side with the improved methods, were obtained. Wet land, Rs. 38; garden land, Rs. 132; and dry land, Rs. 23. This area will now be closed having served its purpose.

164. At Mudiyanur, South Arcot district, a very similar demonstration was conducted with the introduction of improved varieties of sugarcane. The following increases in profit over local methods were obtained:—Wet land, paddy Rs. 39, sugarcane, Rs. 75; dry land, Rs. 4.

165. At Chandathur, North Arcot district, a similar demonstration has resulted in the following increased profits:—Wet land, paddy, Rs. 54, sugarcane, Rs. 385; garden land, Rs. 68; dry land, Rs. 25. The remarkable increased profit on sugarcane is due to a more ambitious programme, the monsoon plough having been used for preparatory cultivation, the Victory plough for trenching, while adequate manuring was given and the setts were planted in lines. In the garden lands, Cambodia cotton was introduced into the rotation.

166. A further development of this system has been carried out in the VI Circle where a Co-operative Society has been induced to conduct such a demonstration area. It is obviously work which should be legitimately undertaken by such societies and which would result in a profit to them. The departmental officers supply the necessary advice. The Lalgudi Sivagnanam Co-operative Society leased 9.5 acres of double crop wet lands on payment of 2,800 lb. of paddy per acre per annum. Two acres were set apart for the demonstration of the various improvements recommended by the department, separately and in combination, and the rest was cropped according to improved methods with the idea of increasing the revenue of the society. The results obtained were very encouraging and the extra profit obtained on the demonstration area as compared with local methods amounted in some cases to as much as Rs. 40 per acre.

167. Individual ryots are being encouraged to conduct similar areas on these lines, the department preparing a cropping scheme and supplying technical advice, and in some cases lending implements and supplying special manures, and seeds, which the ryot would not ordinarily use.

168. It is of interest to note that a similar plan has been adopted in England in the County of Dorset on one of the county council's small holdings. The occupier works under the immediate direction of the agricultural organizer, the arrangement being that the county pays for requisites up to a limit of £50, which the small holder would not purchase in the ordinary course of his business. The tenant on his

part puts into practice the advice of the organizer. Careful accounts and costings are kept and these show that the holdings are likely to prove most successful financially. It is particularly significant that whereas the other small holders in the district were at first inclined to doubt the value of this experiment, they have now completely changed their attitude and are watching the results of scientific management with the greatest interest, and it is intended to start a number of similar demonstrations.

D.—MISCELLANEOUS.

169. *Agricultural Exhibitions.*—As in past years, advantage has been taken of local fairs, and car festivals, to hold small agricultural exhibitions at which specimens of improved crops and seeds are shown, improved implements are seen at work, and actual demonstration of ploughs, sindewahé furnaces, iron cane crushing mills, improved methods of storing cattle manure, etc., are given. Lantern lectures are delivered in the evening. One hundred and thirty-six of such exhibitions were held during the year. A local man of standing is asked to open these exhibitions and to address meetings called in connexion with them. My sincere thanks are due to all those who have so kindly helped us, not only by presiding, but by placing buildings at our disposal. Their hearty co-operation has gone far to make such shows a success. These exhibitions are attended by big crowds, and it is felt that they must do a certain amount of good and help to spread agricultural knowledge.

170. A ploughing competition was held during an exhibition at Ambur for the second year and the prizes, which took the form of implements and seed, were given away by the Honourable the Chief Minister. This is a new idea in South India and one which might be developed.

171. It is interesting to note that an Adi-Dravida of Ayyankovilpatti won a bag of G.E.B. 24 paddy seed as a prize at this competition. He was advised to sow it of course and he actually did so and he got no less than 2,000 lb. of grain per acre which he was able to sell for seed purposes. This is a very gratifying result from a ploughing competition.

172. In some places the weekly shandies at big centres have also been attended and lantern lectures and small exhibitions given at which seeds and implements were displayed and literature distributed.

173. Jamabandi camps have, as usual, been regularly attended by officers of the Department, and advantage has been taken of them to deliver lantern lectures dealing with local problems relating to cultivation and pests and diseases.

174. *Co-operation.*—It is a general practice for officers of the Agricultural Department to attend the periodical general meetings of the co-operative local supervising unions. They also attended other co-operative conferences, such as district and taluk conferences, district conferences of representatives of local unions, and meetings of inspectors and supervisors. At these gatherings they deliver lectures and give demonstrations, and bring to the notice of the co-operators assembled, improved methods of cultivation, improved strains of seed and manures and implements suited to the particular locality. Deputy Directors and other senior officers of the Department become members of the district federations of local co-operative unions which have been recently formed, the idea being that such officers should not only advise and assist in every possible way in regard to the introduction and popularization of improved methods of agriculture, but that they should make use of the federations as vehicles for propaganda work and distribution. These federations are, in fact, one of the means to their hands for getting into touch with a certain number of the ryots. The rural co-operative societies are being utilized for propaganda work and for the distribution of literature issued by the Department, and the secretaries of these societies have been instructed by the Registrar to call meetings of the general body whenever new publications are received in order that they may be read aloud to, and discussed by, the members. At the same time, it must be remembered that the officers of the Agricultural Department have a lot of other things to do, and that they are also concerned with non-members of co-operative societies, and only a limited portion of their time can be devoted to this class of work.

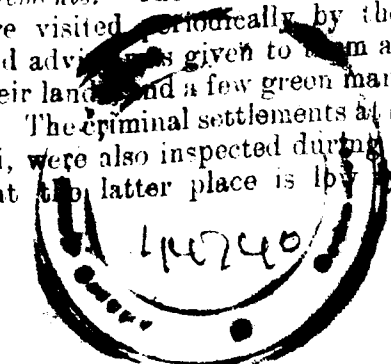
175. It is now proposed to hand over some of the work of distribution of seeds and manures carried on by the Agricultural Department to well organized co-operative societies. If this is found successful it will relieve the Department of a great deal of troublesome work and allow them to devote their energies to other matters. There would appear to be no reason why the cotton seed farm work, for instance, should not be taken over by the co-operative societies. The seed unions can be registered as co-operative societies, and

the members can draw advances from their societies instead of from the Agricultural Department. This would set free money and staff which could be devoted to seed farm work in new areas hitherto untouched, the ultimate aim being to raise pure seed enough of improved strains to supply the needs of the whole Presidency. Could this be done, nothing but these improved strains would be grown and the present danger of mixed seed would vanish.

176. It will be seen that the Agricultural Department is endeavouring to work as closely as possible with its sister Department and that our work in many cases paves the way for the establishment of co-operative societies, and must necessarily come first. There is, no doubt, need and scope for still closer co-operation between the two departments with reference to non-credit work, and it would appear desirable that this work should be entrusted to officers who have had both an agricultural and co-operative training. With this end, in view, the subject of co-operation and rural economies has been introduced into the degree course at the Agricultural College at Coimbatore. I have personally endeavoured to keep in as close touch as possible with my friend and colleague the Registrar during the year, and I have to thank him for many valuable suggestions.

177. *Marketing.*—An attempt has been made to teach the Gōdāvari ryots how to make white jaggery. There is, however, no local market for anything but black jaggery so that assistance was given them to dispose of this improved product in the Vizianagram taluk and thus realize a better monetary return for their sugarcane. The cultivation of ginger has been hampered in South Kanara by the fact that the local market is in the hands of middlemen. To aid the ryots to find a better market the Department started the export of ginger on a co-operative basis to Bombay. As a result of this much better prices were realized. Thirty-two candies were exported in this way and the ryots benefited to the extent of Rs. 600.

178. *Criminal Settlements.*—The four criminal settlements in the II Circle were visited periodically by the Deputy Director in charge, and advice was given to them as to how they could improve their land, and a few green manure crops have been introduced. The criminal settlements at Siddapur, Aziznagar, and Kavali, were also inspected during the year. Much of the land at the latter place is lying with



insufficient drainage and has a tendency to become alkaline. The cultivation of dhaincha and wild indigo was advised and seed of the latter supplied. Floods interfered with the success of this introduction, but second sowings were more successful.

On the whole, very little can be done for these settlements by the Agricultural Department. They are not interested in farming, but more in the raising of vegetables and they are usually hampered by lack of funds and unable to carry out improvements suggested by the Department.

179. *Court of Wards Estates.*—The Department rendered assistance to these estates as usual. On the Kalathikaattu and Pokkanin farms attached to the Devaswom section of the Zamorin's estate, attention was devoted to repairing the damage caused by the floods in 1924. A bad season was again experienced, but the condition of the farms has been improved. The agricultural and dairy farm attached to the Guruvayur Devaswom did good work during the year and formed a useful demonstration to the neighbouring ryots in reduction of seed rate, economic planting, scientific manuring, and the spraying of areca palms to protect them from mahali disease. The stud bulls kept on the farm were taken advantage of by the ryots. A demonstration plot started at Digupohandi on the Bodokkmedi estate was a great success.

180. *Agricultural Associations.*—In January 1923, the District Agricultural Association, Vizagapatam, was wound up and the available funds were placed at the disposal of the Director of Agriculture on the understanding that the interest only was to be utilized in some manner beneficial to the *bona fide* ryots of the Vizagapatam district, the capital being placed at the disposal of any fresh Agricultural Association which might be constituted in this district. The first sum was spent in the purchase of an iron sugar mill and a pan, the use of which were demonstrated, and they were hired to poor ryots, and also in providing seeds, cane setts, manure, and bamboos for propping cane to ryots too poor to invest capital, but anxious to adopt improved methods of growing cane. During the past year, paddy seed has been distributed free to poor ryots. It is now proposed to allow the interest and earnings of the implements to accumulate until there are sufficient funds to buy more mills and pans which will be hired out to small ryots. The small tenant ryot is not often in a position to buy a mill and is forced to hire an inefficient mill from money-lenders. It is thus proposed to capitalize the

funds of the association placed at our disposal in the form of implements which will benefit the poorer class of agriculturists.

E.—CROPS.

(a) Paddy.

181. *Reduction of seed rate and economic planting.*—Aided by demonstration plots on their own land, steady progress is being made with the education of the ryots of the Presidency in the adoption of a reduced seed-rate and the transplantation of paddy, either singly, or in twos and threes, instead of in bunches, as a recognized practice. The advantage of this method is twofold. Not only is there a saving in cost of seed, which more than counterbalances the extra cost of labour for transplanting in this way, while the yield is the same or even better, but the seed saved is available for food which is of considerable importance in famine years and years of scarcity.

182. Experiments on the Samalkota Experiment Station conducted over a period of four years have shown that with a paddy of medium duration, an increased yield up to 15 per cent may be expected from a single seedling planted crop. This method has been demonstrated with good results and in the northern part of the Gōdāvari delta the seed-rate has been reduced over large areas, and has resulted in a saving of from Rs. 5 to Rs. 2 per acre.

183. In the IV Circle, economic planting is a general practice in many districts and not less than 15,000 acres are under this system. In the Panjore delta, the system is spreading, though there is still a belief among the ryots that it results in a smaller production of straw. In the Madura district, the practice is spreading, some 2,000 acres now being economically planted and the seed-rate reduced from 30 or 40 Madras measures to 12 Madras measures. In the Coimbatore district in the Amaravati valley, the area under economic planting is estimated at 3,000 acres and the seed rate has been reduced from 24 vallams to 6 vallams. In the Attur taluk of Salem district, 6,000 acres are economically planted.

184. *Introduction of new varieties.*—There is a steadily increasing demand for the seed of improved paddy strains. In judging the success of these strains, it should be borne in mind that the average yield of paddy in the Madras Presidency from 1915 to 1925 was only 1,013 lb. of grain per

acre, so that any yield above this given by an introduced strain may be looked on as an improvement. As a matter of fact, the improved strains give yields up to 3,000 lb. per acre or more. It is impossible to keep track of the increased acreage under the improved strains, because the ryots themselves now save their own seed and distribute it to others. As an example, however, of the progress which is being made, we may quote the Tanjore delta where the Aduturai strains are spreading. In this district, it has been estimated by the Demonstrators that there are 18,000 acres under A-1; 6,400 acres under White Samba and A-2; 7,300 acres under Nellore Samba; 500 acres under Kuruvai; and 1,000 acres under other improved strains. In this circle, 51,233 lb. of seed was distributed departmentally during the year, while 231,230 lb. is known to have been distributed by the ryots themselves. Over 78 tons of seed of improved strains has been distributed by the Department throughout the Presidency during the year.

185. Every year G.E.B. 24 gains in popularity, and it is now grown over a very wide area. In the Kistna delta, it now occupies 1,000 acres and has yielded up to 3,000 lb. of grain, which commands a premium of Rs. 2 per bag. In the IV Circle, it is very popular, as is also Co. 2, which latter strain has yielded up to 3,500 lb. per acre. In the Periyar tract, 4,500 acres were planted with G.E.B. 24 this year, while Nellore Samba from Aduturai is gaining ground near Melur where it suits the local conditions. On the West Coast, G.E.B. 24 is very popular on account of the fineness of its rice. In Coimbatore and Salem, the demand is chiefly for G.E.B. 24 and Co. 1, though other strains like Co. 2 and Co. 3 have done well under trial on ryots' lands, giving yields of 3,600 lb. and 2,580 lb. of grain per acre, respectively.

186. The demand for seed has increased so much that it is impossible to meet it from the limited resources of the Experiment Stations. An attempt has, therefore, been made in several Circles to meet the requirements of the ryots by means of seed farms on the lines of those which have proved so successful with cotton. Such farms have been started in I, IV, VI, and VIII Circles and have met with a fair measure of success and more is hoped of them in the future. There are great opportunities for co-operative societies to take up this work under the guidance of agricultural officers and it should prove a profitable business.

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(b) *Sugarcane.*

187. The main work in the improvement of this crop consists in the demonstration and introduction of (a) superior varieties, (b) the practice of line planting, (c) trenching, (d) propping and wrapping, (e) manuring, (f) improved furnace construction, and (g) improved mills.

188. J. 247 has been introduced with success in I Circle. It usually gives a heavier tonnage of cane than other varieties though the latter analyse better. In this Circle the method of line planting made steady progress in the cane areas, and in Yellamanchili sub-circle, 312 acres were planted in this way as compared with 65 last year.

189. Three years ago the crop in the Golconda taluk was attacked by red rot. A demonstrator was sent there and J. 247 introduced. Owing to shortage of staff the work had then to be dropped. It was taken up again this year when it was discovered that there were 150 to 200 acres under this variety. This is quoted as an example of the good done by even desultory demonstration of a proved improvement.

190. Coolies skilled in the work they are required to demonstrate are deputed from the farms to assist the demonstrators during the season, and in addition six men were put permanently into the district. This method of demonstration has been found both efficient and economical.

191. J. 247 and Fiji B are finding favour with the ryots at Cumbum and the area under these varieties is increasing steadily, the former covering 20 acres this year. This cane is very popular in the Chittoor taluk and there are now 250 acres planted with it, as compared with 61 last year. In the IV Circle, the area under improved varieties of cane has been trebled, and it is now estimated at 2,150 acres. In 1922, there were only 116 acres under exotic varieties of cane in this circle. The area under sugarcane in South Kanara is stationary, but it is slowly increasing in Malabar. The capital involved is the main drawback, but co-operative societies are coming to the rescue to a limited extent. Red Mauritius is the most popular variety, while Java Hebbal and Barbados canes are gaining in favour, with a resulting improvement in the quality of the jaggery produced.

192. *Iron Mills.*—There is still room for improvement in the mills used for crushing cane and a great deal of juice is lost by imperfect extraction. In the I Circle, a start has

been made in the demonstration of better mills and the ryots have been assisted to improve their local two roller mills by the addition of a third roller so that the canes are first broken. A higher extraction is obtained in this way. In the IV Circle, Chatanoga No. 12 mills, kindly lent to the Department by Messrs. Parry & Co., were demonstrated. Their spread is slow, but there is little doubt that they will ultimately be in demand as sugarcane cultivation is becoming popular in this Circle, and during the year, three power mills were erected. Advantage is taken of local festivals, cattle shows, etc., to exhibit these mills and to actually demonstrate them at work during the cane crushing season. On the West Coast, iron mills have almost completely replaced wooden mills and the ryots themselves import them from Bombay.

193. *Sindewah Furnace*.—The advantages of this furnace were described at length in my Administration Report for 1923-24. A vigorous campaign has been conducted to introduce them into general use among the ryots in all the sugarcane areas of the Presidency and this campaign has met with a large measure of success. In many districts the furnace is now in common use, and in the Coimbatore district the chimneys are quite a feature of the landscape during the crushing season, over 50% of them being at work. In Chittoor again, it would be difficult to find an old type of furnace. All that remains for the Department to do now is to concentrate their attention on such places where this furnace is not known and this is being done. In I Circle, for example, 47 furnaces were erected for ryots. On the West Coast, the Sindewah furnace is rapidly replacing the Poona furnace, which had replaced the old, clumsy, and wasteful pit furnace, and cube jaggery is replacing ball jaggery and commanding a better price. A model furnace has also been built on all the Experiment Stations in sugarcane growing districts so that visiting ryots may have an opportunity of seeing it, and demonstrations are frequently given with it at agricultural shows and exhibitions.

(c) Cotton.

194. The Cotton Specialist's section having made an improved strain of cotton, or such having been evolved on one of the Experiment Stations, the next step is to get it out to the ryots, and to ensure that it is kept pure and unmixed with seed of the local cotton for future sowings. Large

quantities of pure seed are required to meet the demands once a new strain has "caught on" with the ryots. With this crop the difficulty arises, as compared with other crops, that the seed is attached to the lint, the market product of the crop, and there is a danger that the ryots will sell the kapas, and the seed will be lost to them at the ginneries and mixed seed bought for the next sowing. Not only does this spoil the strain, but there is a distinct danger that a strain, over the evolution of which a great deal of time and money has been spent, may actually be lost.

195. *Seed Farms*.—To overcome these difficulties the Department started seed farms. Selected ryots are given seed free of cost on the understanding that they will cultivate the cotton on the lines laid down by the Department, thin it, and weed it at the proper time and keep it pure. At first, the Department adopted the system of buying the kapas at harvest time, ginning it, and selling the lint and retaining the seed for future distribution. This system had its disadvantages, and during the last two years a new one has been adopted, in which the ryots are helped to gin their kapas co-operatively and sell their own lint and benefit by the premium obtained for it, while the Department only purchases the seed which they know to be pure.

196. In order to encourage the ryots to grow cotton under these seed farm conditions and to enable them to keep out of the hands of the money-lender, who is only too willing to advance money against the crop, the Department gives advances to the ryots, to enable them to meet their cultivation expenses, and pays a bonus of Rs. 2 per pothi over the market value of the seed at the time of purchase. This has been found a good system and it results in no loss to Government. At first, the ryots did not like this new system, but they have now taken to it and realize that under it they get the profits formerly taken by Government.

197. During 1924-25 in VIII Circle, 963 acres of seed farms growing Cambodia cotton round Avanashi, Perumnallūr, and Karumathampatti, returned 219,500 lb. of seed which was purchased at Rs. 10 per pothi of 250 lb. The lint amounted to 116,459 lb. and this fetched Rs. 300 to Rs. 305 per candy of 500 lb., which was Rs. 20 over the prevailing market rate. During 1925-26, the present season, the seed farm area amounts to 1,151 acres, of which 225 acres are sown with Strain No. 15, and the rest with Strain No. 295. A new centre has been started at Palladam.

198. A comparative trial was conducted during 1924-25 on the seed farms between these two strains, and No. 295 showed a superiority in yield of 121 lb. per acre, and it is also an early maturing cotton.

199. As noted above, a quantity of 215,500 lb. of pure Cambodia seed was obtained during 1924-25 from the seed farms. Depots were opened at important centres in the Salem and Coimbatore districts and most of this seed was sold at Rs. 1-8-0 per lb. The whole was not got rid of owing to the short sowing season on account of late rains.

200. In the Trichinopoly district 17,704 lb. of Cambodia seed obtained from the VIII Circle was distributed and the ryots themselves obtained 20,000 lb. from Tiruppur. Some 5,000 acres are known to be under departmental strains of cotton in this district and the area is probably considerably greater than this. During the year 25,000 lb. of kapas was ginned for ryots to whom departmental seed had been distributed, and 15,000 lb. of good seed was obtained for future distribution.

201. *Karunganni Cotton*.—In the VI Circle, in the Madura district, in addition of Cambodia, Karunganni is largely dealt with. This is the trade name given to Company cotton which has been produced by careful selection work at the Kovilpatti Experiment Station. A number of new and much improved strains have been evolved and, in order to obtain seed of these for the ryots, 87.79 acres were placed under seed farm conditions under the old system, and 267.62 acres under the new system. In the former case, 17,828 lb. of kapas were purchased which yielded 5,466 lb. of lint and 11,782 lb. of seed. The lint was sold for Rs. 3,100. In the latter case, 47,621 lb. of seed was purchased. The total expenditure on the whole transaction was Rs. 8,084, while the receipts amounted to Rs. 8,576, so that there was a small profit of Rs. 492, thus making the cotton improvement work in this circle self-supporting. The stock of seed obtained was used for distribution to ryots in this and other circles. The total quantity of pure Karunganni seed distributed to ryots in the VI Circle during the 1925-26 sowing season amounted to 61,080 lb. obtained from seed farms and experiment stations, sufficient to sow 6,108 acres.

202. The demand for Karunganni cotton seed has increased in the VIII Circle year by year, and so it was decided to place this cotton also under seed farm conditions

in order to establish a pure and better strain at Palladam and Udamalpet. 813 acres are now under these conditions. In 1924-25, 76,875 lb. of Karunganni seed was obtained from VI Circle and much of it was distributed. The germination was not good, however, and this led to disappointment and this fact has gone far to determine the trial of seed farms in the Circle for the supply of this cotton. The whole of the money expended in this particular form of cotton improvement was received and paid into the Treasury. The expenditure in 1924-25 amounted to Rs. 17,970, while the receipts amounted to Rs. 18,772, leaving a profit of Rs. 802.

203. *Co-operative Societies*.—The next step in advance with this work has been taken during the year. By this system of seed farms the cotton growing ryots have learned the rudiments of co-operation and societies are now being formed to take over the work, and it is hoped that it can very shortly be handed over entirely to such societies, who will be capable of raising their own stocks of pure seed without the aid of the Department. This will set both officers and money free to take up the work in other districts where it has not hitherto been introduced.

204. The co-operative societies will be able to give advances to their members, and with this object in view it is proposed to adopt a system of gradually reducing the departmental advances till the societies get on their feet and then withdrawing them altogether and utilizing the money thus set free to open seed farms in other centres, to be ultimately formed into co-operative societies, until enough seed of pure strains is raised to supply the whole Presidency. Five such societies have been formed and of these three have been registered and have started work.

205. This is a notable instance of the Agricultural Department working in close touch with the Co-operative Department, but it is worthy of notice that the latter department would have been able to do little, and in fact, did do little, till the Agricultural Department had done the spade work and educated the ryots up to a point where they were ready and willing to form co-operative societies. This is one of the many instances where it is necessary for the Co-operative Department to follow up the work of the Agricultural Department, and not *vice versa* as is sometimes advocated.

206. *Seed Unions*.—Another plan adopted by the Department for the production and distribution of pure seed is the

establishment of seed unions. These consist of panchayats who agree to grow departmental cotton, gin the produce co-operatively, and retain the seed for sale and sowing purposes. When first started they were subsidised by the grant of a bonus, but this was discontinued in 1924. Nine unions were at work during the year and they produced 130,923 lb. of seed. There is a proposal on foot to make these unions in future run on the principle of co-operation with the help of the Co-operative Department.

207. *Co-operative Ginning and Joint Sale.*—This has not met with uniform success, but on the whole, 119,482 lb. of kapas were ginned co-operatively and 77 candies of lint obtained, and 106,259 lb. of seed distributed for sowing purposes. The total amount of seed distributed by means of the agency of departmental supply, seed unions, and co-operative ginning amounted to 298,267 lb., sufficient to sow an area of 29,826 acres in this circle. In addition to this, private agencies have come into existence to supply pure seed, and it is estimated that these supplied 364,711 lb. of seed, though this is probably an under estimate.

H. 25.—93,898 lb. of H. 25 cotton seed was distributed in the Bellary district during the year, and the total area sown was 167,963 acres. This was less than last year owing to the season being late. The season was not a good one, and only 51 bales of lint were sold by the Department for the ryots, a premium of Rs. 20-8 0 per bale of 400 lb. being obtained over the market rate for local cotton. A great deal of admixture of this cotton takes place with the local cotton and this adulteration is spoiling its good name, but as matters stand at present, it is impossible to stop it.

In the Anantapur district, about 10,000 acres were under this strain, but owing to untimely rains in December and January, it did not do well and compared badly with Dharwar American.

N. 14.—The seed of this strain was distributed for sowing, in red and mixed soils only, and 78,000 lb. were given out sufficient for 12,300 acres. This is a reduction on last year owing to the fact that a low premium was obtained for it in the previous year. This year it gave better results than the local cotton which will probably encourage ryots to grow it in future. The premium obtained for it varied from Rs. 35 to Rs. 40 per candy.

208. *Drilling.*—There are great advantages in drill sowing cotton and other crops. This practice enables



FIELD SOWN CUMEDIA COTTON—INTERCULTIVATION.



EIGHT-YEAR OLD COCONUT TREE - NILESINAR COCONUT STATION

mechanical implements to be used for weeding and intercultivation at a considerable saving in cost. During the year, 837 acres of cotton were drill sown in the VIII Circle in the Coimbatore district, and six acres in the Salem district, where it is quite a new idea. In addition 150 acres of other crops like cholan, groundnut, cumbu, and pulses were drill sown in this circle. This is an advance of some 442 acres on last year, so that the practice may be said to be making slow but satisfactory progress. In the VI Circle, the practice of drill sowing has found favour among the ryots as a result of intensive propaganda work during past years. Some 13,500 acres were drill sown this year, of which 11,600 were drilled by the ryots themselves without departmental help. This is an increase of 970 acres over last year and had not the monsoon rains been late, still further progress would have been recorded. Fifty-three drilling sets were sold and the ryots make a great many for themselves. Drill sowing of paddy is a common practice in the Chingleput district, and attempts are being made to introduce this method into other parts of the Madras Circle, and 55 acres were sown with departmental drills as a demonstration.

(d) *Coconuts.*

209. The Department has, during the last four or five years, systematically demonstrated the possibility of raising coconuts under a dry system of cultivation. It is usually believed that it is necessary to water coconut seedlings during the hot weather for the first few years of their life, but the Department has satisfactorily demonstrated the fact that this is not the case, provided that deep ploughing is done in the first instance and that the land is kept constantly cultivated and the top layer stirred during the hot weather to conserve the soil moisture. One hundred and forty demonstration plots have now been established, scattered throughout the length and breadth of South Kanara, and a very satisfactory feature of this work is that only one of these plots is maintained at Government expense. Seventeen are financed by local boards, while the rest are paid for by the ryots themselves. Some of these plots have been opened in the compounds of rest houses and district board offices. In fact, the most public places have been searched for where even the casual passer-by must see them. The importance of this work lies in the fact that there are thousands of acres of land now lying waste in South Kanara which could

be brought under coconuts by adopting this system, even the high lands being suitable. That our work in this direction has not been in vain is evidenced by the fact that there has been an increase in the acreage under coconuts of 6,000 acres in Malabar and 3,000 acres in South Kanara during the last six years, while the demand for seedlings is so great that it cannot be met; 6,689 seed nuts and 2,993 seedlings were supplied from the experiment stations during the year.

210. The Experiment Stations at Nileshwar and Pilicode are beginning to show the final success of this dry system of planting. Here, though not a drop of water has been given artificially to the palms since the day they were planted, those planted in 1918 and 1919 are beginning to bear. At Pilicode, 32 per cent of the trees planted in 1918, and 25 per cent of those planted in 1919, have flowered and 36 nuts have been harvested. At Nileshwar, still better results have been obtained, since on this station 61 per cent of the trees planted in 1918, and 45 per cent of those planted in 1919, have flowered and a crop of 209 nuts has been harvested during the year. It is on these results that our demonstration in the district is based.

(e) Potatoes.

211. Efforts have been made in recent years to introduce the growing of potatoes into other districts than the Nilgiris. In the latter hills, the cultivation is mostly in the hands of the Badagas who are not as yet sufficiently educated to understand or adopt co-operative methods by which alone much advance can be hoped for. In order to supplement the supply of seed from the Nanjanad Experiment Station, an attempt has been made to start seed farms, and about eight acres were under this system during the year. Twenty-one and three-quarter acres were under seed farms in the Shevaroy Hills and a certain amount of success was met with. The cultivation has now been introduced into the Hosūr taluk where there are three planting seasons, viz., May, September, and December, with a good market close at hand in Bangalore. The ryots do not preserve their own seed as a rule, and the Department is taking steps to demonstrate how this can be done and to replace the local variety grown with strains which give a higher yield and are more disease resistant.

29

(f) Other crops.

212. *Turmeric*.—An improved method of curing this crop, by means of a boiling pan similar to that used for sugar on a Sindewah furnace, has been again investigated during the year. It has been shown that there is a considerable saving in fuel and labour in the use of this new type of pan and no deterioration in the finished product. Two of such pans are in use at present, but the work has been hampered by the heavy fall in price of the product from Rs. 150 to Rs. 35 per candy.

213. *Tobacco*.—The tobacco nurseries in the II Circle were badly damaged by the heavy rains of October and this resulted in a shortage of seedlings and a reduction in area of the main crop. There were about 5,000 acres under Adcock and White Burley varieties, chiefly the former. Trials are being made with potash manures for this crop and the results are encouraging.

214. *Chillies*.—The chillie crop was a complete failure in the Guntūr district owing to an attack of thrips, and the manurial campaign could not be continued owing to lack of fish-guano supplies. Oil-cakes were substituted as far as possible.

215. *Fruit*.—There are large citrus and mango gardens in the II Circle, but as a rule cultivation on these is neglected. The Department have advocated and demonstrated systems of intercultivation, green manuring, and the use of fertilisers like bone meal, and in some places, their advice is being followed. The small fruit orchard started at Taliparamba has demonstrated the fact that some species like anonas, rose apples, loquots, sapota, guavas, and citrus will grow very well under West Coast conditions and it is hoped to demonstrate and introduce some of these in future years. Spraying of mangoes for hopper has also been demonstrated on a large scale.

216. *Groundnuts*.—A new experiment station for the study of this crop was opened during the year at Palakurpam. Attention will be mainly devoted at first to the study of varieties with the object of selecting better strains than those grown at present. Work is being done in co-operation with the Mycological section on the control of Wilt disease caused by a fungus—*Rhizoctonia*—on this crop. Soil and seed disinfection experiments are being conducted, but not much advance was made this year as the disease made its

appearance in a very modified form. This is satisfactory from the growers' point of view, but is not so satisfactory from the research point of view, as it is difficult to form definite conclusions when treated and untreated plots are alike unaffected by the disease under study. It has been found that the pods harbour the fungus so that seed disinfection is the most promising line of control.

F.—IMPLEMENTS.

217. As in former years, special attention has been paid to the introduction of iron ploughs in all circles and a very large number of ploughing demonstrations have been given on all possible occasions. As a result of this, 1,713 ploughs of various kinds have been sold during the year. There are quite a number of good ploughs now on the market, but the ryot is still attracted by the cheapest, and the Konkon, Meston, and Monsoon are the most popular. There is a great future for a really good and cheap iron plough in this country. Specially good progress was made in the II Circle where the sales increased from 89 last year to 137 this year, while in the III Circle the demand for heavy ploughs like the Sabul and Kirloskar for use on the black cotton soils is increasing, 71 having been sold this year as compared with 37 last year.

218. That the ploughs sold are being used, and not merely bought to please an agricultural officer and kept as a curiosity, which has been known to happen, is shown by the sale of spare parts. The demand for shares and share points is a good indication of the amount of work which is being done by iron ploughs, and 2,969 shares and share points were sold during the year, while many are made by local blacksmiths. These figures compare well with those of last year which were 1,834 ploughs, and 2,681 spare parts and we can safely say that we have reached a point where about 1,500 iron ploughs are being sold each year. As the life of a plough is three or four years there must be now a large number in use in the Presidency.

219. A few other improved implements are in use, but a machine must be very simple and very cheap to appeal to the ryot. Roll easy mhote wheels, for example, have gained favour in the V Circle where 41 were sold. With the introduction of drill sowing of cotton and other crops, a demand for intercultivating implements like the junior hoe has arisen and a few have been sold, but their high

price is against them. In districts like North Arcot where this implement is well known, there would appear to be a chance for an implement like the McCormic Deering cultivator. One of these implements obtained for demonstration was purchased at once and two others were sold in the Coimbatore district.

220. There is an opportunity here for the co-operative societies to purchase such implements and hire them out to the members. There is a brisk demand for implements on hire from all our Experiment stations, a demand which is met as far as possible when implements can be spared.

221. On the whole, however, ryots take to new implements very slowly. In 1924, Government sanctioned the purchase of a number of machines of the larger type for trial and demonstration on Experiment stations, but their high price is against them. Power chaff cutters, for instance, are found to work very efficiently, but the ryots prefer a small hand machine costing about Rs. 20, and 33 of these were sold during the year. They result in economy of fodder when material like cholam stalks is being fed to cattle. Trials with reaping machines showed that they were useful so long as the crop did not lodge, but when lodging had taken place they could not be used.

G.—MANURES.

(a) Green Manures.

222. The popularization of green manures has been attended to in all Circles during the year and the total quantity of seed sold to ryots from departmental depots amounted to over 109 tons.

223. In the I Circle, the practice is practically unknown to the ryots and is of very recent introduction. Steady progress is being made as witnessed by the fact that 20,767 lb. of seed were sold as compared with 10,596 last year, and in Bobbili and Berhampur, 312 acres were under green dressings as compared with about 150 last year.

224. In the II Circle, there is a big demand for seed of wild indigo, but this cannot always be supplied and attempts are being made to induce the ryots to use other kinds of green dressings like dhaincha and kolinji, and 9,000 lb. of seed of the former, sufficient to sow 587 acres, were distributed during the year. In the III Circle, facilities do not exist and rains

cannot be depended upon for green manure crops and, in all probability, the practice has been extended as far as is possible. In the IV Circle, the advantages of green manuring are well-known and the main difficulty is to procure sufficient quantities of seed. Over 22,000 lb. of indigo seed were obtained from the III Circle and distributed, a phenomenal amount which is a gauge of the spread of this practice. Many of the ryots in this Circle have now begun to make their own arrangements for obtaining seed, though they still prefer departmental seed on account of its purity and good quality. In the V Circle, the success of green manures depends upon the rains. This year some 18,000 acres were under green manure crops of one kind or another. This Circle is the source of supply of seeds to a large part of the Presidency. On the West Coast, the main difficulty is to get seed at the proper time. In many places kolinji has become a self-sown crop and ryots are being encouraged to collect and distribute the seed. Large areas of kolinji are grown in the Bhavani valley and dhaincha and sunn-hemp have been introduced on a large scale in the Amaravati and Noyal valleys, there being some 2,000 acres in the former locality. In Salem district, the practice of growing dhaincha has become an established practice. In the Attur taluk, seed farms have been established for the production of dhaincha seed.

225. Some idea can be formed of the success of this work when it is stated that during the year 109 tons of green manure seeds of different kinds have been distributed departmentally. In addition to this, large quantities are collected and distributed by the ryots themselves. The seed distributed was sufficient to sow about 18,000 acres, and the monetary gain may safely be put at the modest figure of Rs. 5 per acre. On this basis, Rs. 90,000 has been added to the agricultural wealth of the country by direct efforts of the department in this one item alone.

(b) *Artificial Manures.*

226. The demand for artificial manures is steadily growing. Messrs. Parry & Co. inform me that during the year 1925, they sold 1,345 tons of such manures (excluding fish guano) in the Presidency. Much of this manure was sold from departmental depots. The ever increasing demand for oil-cakes has forced up their price to such an extent that it now costs per unit of nitrogen more than other nitrogenous fertilisers on the market in many places. This is due

to the fact that the supply of oil-cakes is limited while increasingly large quantities are exported annually. The export of oil-cakes from the Madras Presidency during the last three years has been as follows:—

	1923.	1924.	1925.
	Tons.	Tons.	Tons.
Groundnut	19,974	14,878	19,404
Gingelly	4,863	10,873	17,797
Castor	622	3,317	1,233
Total	25,459	28,668	38,434

[All efforts at controlling this export, either by total prohibition or by the levy of an export tax, have met with faint response so that the department has been forced to turn its attention to other means of combating the evil.] All our research work points to the fact that organic manures are necessary and essential and that they can only be supplemented with artificials to a limited extent. A number of demonstration plots have been designed to teach the ryots the benefits of such manures as nitrate of soda, sulphate of ammonia, bone-meal, and superphosphate, in conjunction with organic manures such as cattle manure and green dressings, careful attention being paid to the economic aspect of the question. Were the sale of such artificial fertilizers properly organized by the trade, the demand for them would increase more rapidly than it is doing at present. There are signs, however, that the trade is taking up this matter seriously and during the past few months one firm at least has started an organized campaign in the Presidency for selling such fertilizers at a flat rate, and has started propaganda in harmony with the advice given by the Agricultural department, and other firms are likely to follow their example.

227. In the Vizagapatam and Gōdāvari districts, both groundnut poonac and bone-meal can be obtained at a cheap rate despite the increasing export, so that there is little demand as yet in these areas for artificials.

228. In the Kistna delta, there was a large demand for fish guano, but this could not be supplied owing to the shortage on the West Coast. It is estimated that 1,621

acres were manured with artificials in this Circle during the year, which is a considerable advance on former years. Superphosphate in conjunction with green manure for paddy has shown a profit of Rs. 15 per acre.

229. In the IV Circle (Madras), bone-meal is becoming popular and the Tindivanam Co-operative Agricultural and Industrial Society sold over 60 tons of this fertilizer to ryots during the year. Messrs. Parry & Co. inform me that their sales in this Circle amounted to 756 tons, of which 443 tons were purchased in the Chingleput district.

230. In the Tanjore delta, the manuring problem is a peculiarly difficult one, but the ryots are beginning to learn the benefits of artificials and about 100 tons were purchased, including five tons of Trichinopoly phosphates.

231. In the Bellary Circle, bone-meal is coming into favour and 25 tons or more were purchased by ryots from firms and the Kadambur bone factory.

232. On the West Coast, fish manure is relied upon very largely and when the supply failed a good deal of oil-cake was purchased. Bone-meal in conjunction with green manure is also coming into favour as a result of departmental demonstration.

233. In Coimbatore and Salem districts trials of bone-meal in conjunction with green manure have been disappointing.

VII.—AGRICULTURAL ENGINEERING

234. The College estate is so large that it takes the whole time of the Assistant Agricultural Engineer to look after its upkeep, to carry out repairs to bungalows and buildings, to keep the oil-engines, pumping plant, gas plant, electric plant, and roads in proper order, and it leaves him no time at all for research work. That there is need for research work of an agricultural nature has been pointed out above when discussing implements, but this can never be done until a Research Engineer is appointed and an efficient workshop has been provided. This principle has been accepted, but the post of Government Agricultural Engineer has not yet been filled.

235. 195,625 cubic feet of gas were manufactured during the year to supply the needs of the laboratories at a cost of Rs. 11-9-8 per 1,000 cubic feet. With the completion of the Freeman Building, which is expected to take

place early in the coming year, another gasometer will be necessary. The electric plant was thoroughly overhauled and renewed. It was run for 1,056 hours at a cost of Rs. 1,098. The water-pumping plant provided a minimum of 40,557 gallons and a maximum of 60,523 gallons per day irrespective of irrigation. The workshop executed orders to the value of Rs. 6,190. Work was carried on under difficulties, but I am happy to say that funds have been provided during the coming year for the erection of a new workshop and in future the work will be carried on under more favourable conditions.

VIII.—PUBLICATION AND SUPPLY OF INFORMATION.

236. The Year Book of the Agricultural Department for 1924 was published during the year.

237. Leaflets on "Rice Hispa" and "Graft Mangoes" were reprinted.

238. *Notebook of Agricultural Facts and Figures*.—There is a great demand for this publication. Three editions have been published so far and copies are now nearly exhausted. It is under consideration to issue a fourth edition. As the English edition of the book has become very popular it was thought that its use and popularity would be increased if a vernacular edition was published. During the year a Tamil edition was therefore issued.

239. The Villagers' Calendar for 1925-26 was published as usual in English and the vernaculars. On the whole 77,100 copies were printed for sale and distribution.

240. The monthly digest continued to be issued in English and the vernaculars and it is widely circulated.

241. The officers of the department contributed the following papers to the Indian Science Congress—held in Bombay in January 1926 :—

- (1) "Control of *Nephantis* by its parasites."
- (2) "Some Indian *Lepidoptera* with abnormal habits."
- (3) "A new variety of *Tetraneura ulmi* in South India."
- (4) "The distribution of mineral matter in the Cotton Plant."
- (5) "The Chemical Examination of Bitter gourd."

242. The undermentioned papers were also issued during the year from the different sections for publication in various journals:—

- (1) "The genus *Aphrastobracon*, Ash and its allies with notes on Indian forms."
- (2) "Sex differentiation in Lepidoptera pupae."
- (3) "*Psara phocopteralis*—a pest of the grasses in South India."
- (4) "South Indian *Thysanoptera*."
- (5) "The Nim scale—*Pulvinaria maxima*."
- (6) "A check list of Indo-Ceylonese *Chalcididae*."
- (7) "Biological methods of insect pest control."
- (8) "Thrips—a little known group of insects."
- (9) "Two new *Thysanoptera* from South India."
- (10) "An Annotated list of Indo-Ceylonese *Thysanoptera*."
- (11) "The Pollu Disease of Pepper."
- (12) "*Syria melanaria*—predaceous on *Copotosoma extensum*."
- (13) "Some *Aphididae* from Southern India."
- (14) "Root sucking Aphids from Coimbatore."
- (15) "The Manufacture of annatto dye for colouring butter."

IX.—ACCOUNTS.

243. *Agricultural loans*.—No loans were sanctioned by me. The receipts and expenditure for the year and the corresponding figures for the previous year are as follows:—

	1924-25.	1923-24.
	RS.	RS.
Expenditure	13,72,179	15,38,532
Receipts	2,51,500	2,47,193
Net expenditure	11,20,679	12,91,339

These are extracted from the departmental accounts. The increase in expenditure in the current year as compared with the expenditure in the previous year is largely due to—

- (i) cost of land acquired for the new paddy breeding station at Maruteru in the West Gōdāvari district,
- (ii) the extra compensation awarded by the courts in respect of lands acquired for
 - (a) Millets breeding station, Coimbatore,

- (b) Cotton breeding station, Coimbatore.
- (c) Paddy breeding station, Aduturai, and
- (iii) the development of the cattle farm at Hosur during the year.

X.—STATISTICS.

244. *Weekly and monthly season reports*.—At the beginning of the year, the Government took into consideration the question of the venue of compilation of agricultural statistics and other statistical returns in connexion with the administration of famine in the Presidency. Pending final orders, Government requested the Board in G.O. Mis. No. 1247, Revenue, dated 8th August 1925, to issue immediate instructions to Collectors to submit the season reports to the Board direct instead of to the Director of Agriculture. The weekly season report has, therefore, been compiled by the Board since 15th August 1925. In G.O. Mis. No. 1472, Revenue, dated 22nd September 1925, Government directed the retransfer of the weekly and monthly season reports to the Board of Revenue on the ground that these two returns are required by paragraph 7 of the Famine Code and are solely intended to give administrative officers early intimation as to the state of the season. One clerk on the routine scale was transferred to the Board's office on the 12th October 1925 to attend to this work. The fortnightly return of retail prices and the annual season and crop report continue to be dealt with in this office.

245. *Annual Season and Crop Report*.—The report for 1924-25 was issued on the 6th February 1926 in an improved form and was favourably reviewed in the newspapers. My thanks are due to the Superintendent, Government Press, for making special arrangements to print and issue this report within a fortnight of the receipt of the text. The free supply of copies of the report to officers outside the Presidency was discontinued this year under the orders of Government.

The Kistna district was bifurcated into two districts, West Gōdāvari and Kistna, on the 15th April 1925 and the old Gōdāvari district re-named the East Gōdāvari district. The taluks of the West Gōdāvari district were reconstituted with the effect from the 4th January 1926.

The normal figures of area were revised in the year on the basis of the latest three non-famine years. The provisional figures of livestock published in the previous year's

report were corrected where necessary and the final figures published in this year's report.

246. *Forecasts.*—The areas estimated in the crop forecasts in 1924-25 differed from the actuals by 0.4 per cent for cotton, 1.4 per cent for sugarcane, 3 to 4 per cent for paddy, groundnut, and gingelly, and 7.7 per cent for castor. The large variation for castor is due to the fact that the cycle of four years for the crop referred to in the season and crop reports of previous years was not maintained in the year under review and there was an increase in the total area instead of a decrease, as anticipated.

In G.O. Mis. No. 1164, Development, dated 10th August 1925, Government ordered the issue of three reports on the summer and early crops of groundnut in April, July, and August, respectively, and changed the date of the final report from February to January with a view to render the reports more useful to the trade. The necessary amendments to the Manuals of Taluk Accounts were issued and the Board requested the Collectors of South Arcot, Chittoor, North Arcot, Salem, Coimbatore, and Tanjore to issue executive instructions for the submission of forecast returns on groundnut in April and August. The report in July is a condition report based on information furnished by Deputy Directors.

With a view to record the area under different varieties of cotton separately, the Collectors of Salem, Coimbatore, Trichinopoly, Madurai, Rāmnād, and Tinnevely were requested to issue necessary instructions in the village sheet of the district gazette. The difficulty of differentiating between karunganni and uppam before January in Madurai, Rāmnād, and Tinnevely was obviated by issuing instructions to the Collectors that irrigated cambodia, unirrigated cambodia, and country cotton alone should be shown in the accounts till January and that, from January onwards, the country cotton should be re-classified into (1) karunganni, (2) mixed country, and (3) uppam according to the proportion of karunganni and uppam in the mixture. The forecast returns received from Tahsildars this year gave fairly satisfactory information about the areas under the different varieties.

The Board of Revenue was requested to issue executive instructions to the Collectors of Guntūr, Kurnool, Bellary, and Anantapur to the effect that the area under the mixed

crop of korra and cotton may be recorded separately in the village accounts.

The question of publishing intermediate crop reports between the regular forecasts and giving therein a condition figure for the crop has been under the consideration of Government since 1924. Government were informed that 19 intermediate reports on forecast crops are necessary and that they will be of value only if returns are received from Tahsildars, as in the case of the regular forecasts.

Printed copies of forecast reports are now received from the Government Press in three days and are distributed promptly.

The President of the International Institute of Agriculture, Rome, requested that forecast reports on rice, sugarcane, and cotton might be cabled to him at his cost. This arrangement was accepted.

247. *Crop cutting experiments.*—The Superintendent, Central Farm, conducted crop cutting experiments on the Bihar method in the Central Farm on paddy, cholam, and Bengal gram with the help of an iron triangle made here, similar to the one in use in Bihar. The results of the experiments with cholam and Bengal gram were meaningless and the probable error was too high. The yields per acre as per triangle determinations also differed greatly from the actual yields per acre from the plot. As regards paddy, the errors were not so great, but the question of allowances required for bunds and dryage seems to call for further examination. On the whole, the Bihar method cannot be usefully employed in Madras. No crop cutting experiments can be conducted here for want of money and staff.

248. *Inspections.*—The Statistical Assistant inspected the statistical registers relating to crops and prices in the taluk offices of Anantapur, Dharmavaram, and Gooty.

249. *Cotton mill and press return.*—The weekly return showing the receipts of all cotton at mills, the exports by sea, and the receipts of unpressed cotton in presses and mills relates to the week ending Friday and continues to be published and distributed as before. The mill returns are still on a voluntary basis and stamped addressed forms are supplied to mill owners free of cost. The Superintendent, Government Press, has kindly arranged for the prompt printing of the return and it has therefore been possible to distribute it within four days of its preparation.

The Bengal-Nagpur Railway was requested to discontinue the monthly returns showing the movements of raw cotton along the railway which were being sent for an annual subsidy of Rs. 50 as there seemed no prospect then of reviving the monthly returns showing the movements of raw cotton along railways. The Government of India have now decided to revive these returns in September 1926. Figures of movements by rail will add to the utility of the cotton mill and press return.

The question of classifying by varieties the cotton exported by sea was considered this year and the Collector of Customs has now promised to furnish this information.

250. *Cotton markets.*—The question of undertaking legislation for the establishment of cotton markets in the Presidency on the basis of the markets established in Berar has been under the consideration of Government for the past few years. It has again been postponed, to be dealt with by the next Legislative Council.

251. *Finance of the cotton crop.*—The Indian Central Cotton Committee issued a preliminary questionnaire on cotton marketing and the financing of the cotton grower with special reference to his power to hold his produce for short periods during a temporary slump in prices. The opinions of the members of the Provincial Cotton Committee and local cotton committees were obtained and forwarded to the Secretary, Indian Central Cotton Committee. From the information received, the Committee decided to undertake special local investigations in certain areas including the Northern and Westerns area, with a view to find out for a limited number of villages and markets exactly what the existing conditions are. Questions were printed and issued to investigators who were asked to obtain answers from every cotton grower in the village and every seller in the market on certain days. The inquiry was carried out by the staff of the department in three villages each in the Bellary, Adoni, and Nandyal sub-circles and in the markets at these centres. A research scholar from Allahabad also assisted in the inquiry at the request of the University of Allahabad. The results of the inquiry have not yet been received as the season for cotton picking was unusually late this year.

252. *The Provincial Cotton Committee.*—The Government appointed the Commissioner of Labour, Madras, an official member of the Provincial Cotton Committee to facilitate

mutual consultation between him and the trade in connexion with plans for cotton ginning factories. The Committee now consists of four officials, three non-officials elected by the Chambers of Commerce, and three non-officials nominated by Government.

A meeting of the Committee was held on the 8th and 9th March 1926. The grant of licences for the import of kapas by rail into protected areas and the working of the Cotton Transport Act were the most important subjects discussed.

253. *Local Cotton Committees.*—There was no time limit to the term of appointment of the members of the local cotton committees. The Government fixed it at two years on the recommendation of the Provincial Cotton Committee. The members of the local cotton committees were nominated afresh this year.

The local cotton committees at Tuticorin, Tiruppur, Bellary, Nandyal, and Guntur met during the year to consider the draft rules under sections 12 and 13 of the Cotton Ginning and Pressing Factories Act, 1925.

254. *Establishment.*—Government sanctioned a clerk-typist for six months in the year to relieve the pressure of work in connexion with the annual returns and forecasts. They also sanctioned a clerk on Rs. 65 per mensem temporarily for one year to deal with the work relating to the two cotton Acts. The Cotton Ginning and Pressing Factories Act came into force in August 1925 and the Cotton Transport Act on the 24th November 1925, but the clerk joined duty only on the 15th January 1926. All correspondence relating to the two Acts and rules under them and all applications for licences and forms were dealt with promptly. There was thus considerable strain on the staff till the clerk on Rs. 65 joined duty.

The establishment in the statistical section at present is shown below:—

One Superintendent on Rs. 125—5—150.

One clerk on Rs. 65—4—85.

One temporary clerk on Rs. 65.

One clerk on Rs. 40—65.

One clerk-typist on Rs. 40 from July to December.

255. *General.*—The Board of Revenue was informed that the Madras daily weather report should be published continuously throughout the year, as there is no month in the year when the incidence of rainfall is not of importance both from an agricultural and commercial point of view.

diseases of cotton, cholam, coconuts, arecanuts, pepper, turmeric, tobacco, and betel vine.

266. *Livestock*.—Cross breeding with half breeds will be continued. Good Scindh, Kangayam, and Ongole herds will be worked up by selection and work will be begun with an Alambadi herd at Hosur which is in the breeding tract for this strain. Cross breeding of buffaloes will be continued. Feeding experiments and animal nutrition work will be undertaken in collaboration with the Imperial Physiological Chemist. It is hoped to send milk from Hosur to the Madras hospitals during the coming year.

267. *Manures*.—Experiments to test the value of different nitrogenous and phosphatic fertilizers in various combinations and with green dressings will be continued. Special attention will be paid to the possibility of making synthotic farm yard manure on the Experiment stations.

268. *District work*.—This will be continued and developed on the usual lines and as many demonstration plots as possible will be opened. Special efforts will be made in the I Circle to produce more green manure seed and to push the line planting of sugarcane and the use of the Java nursery system. In the II Circle, special attention will be paid to deep water paddies, and the cultivation of turmeric with a sabul plough. In all Circles, attempts will be made to demonstrate the making and use of silage in connexion with the fodder problem. Work will be done as closely as possible with the Co-operative Department, and a trial will be made of handing over a good deal of the seed and manure distribution to co-operative societies.

269. *Agricultural Education*.—The teaching at Coimbatore will be transferred to the Freeman Buildings. The degree course will be continued. Special attention will be paid to rural economics and co-operation. The agricultural middle schools at Taliparamba and Anakapalli, and the farm schools will continue. It is hoped to open a new agricultural middle school at Kalahasti during the year.

I have the honour to be,
Sir,
Your most obedient servant,
RUDOLPH D. ANSTEAD,
Director of Agriculture.

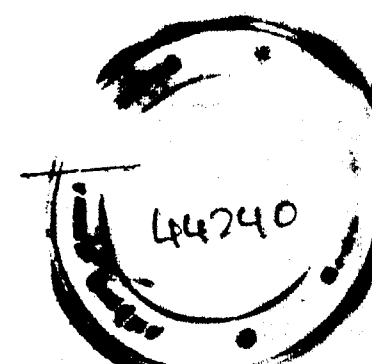
2nd August 1923.

APPENDIX A.

Area under main crops in each agricultural division (average of six years ending 1921-22).

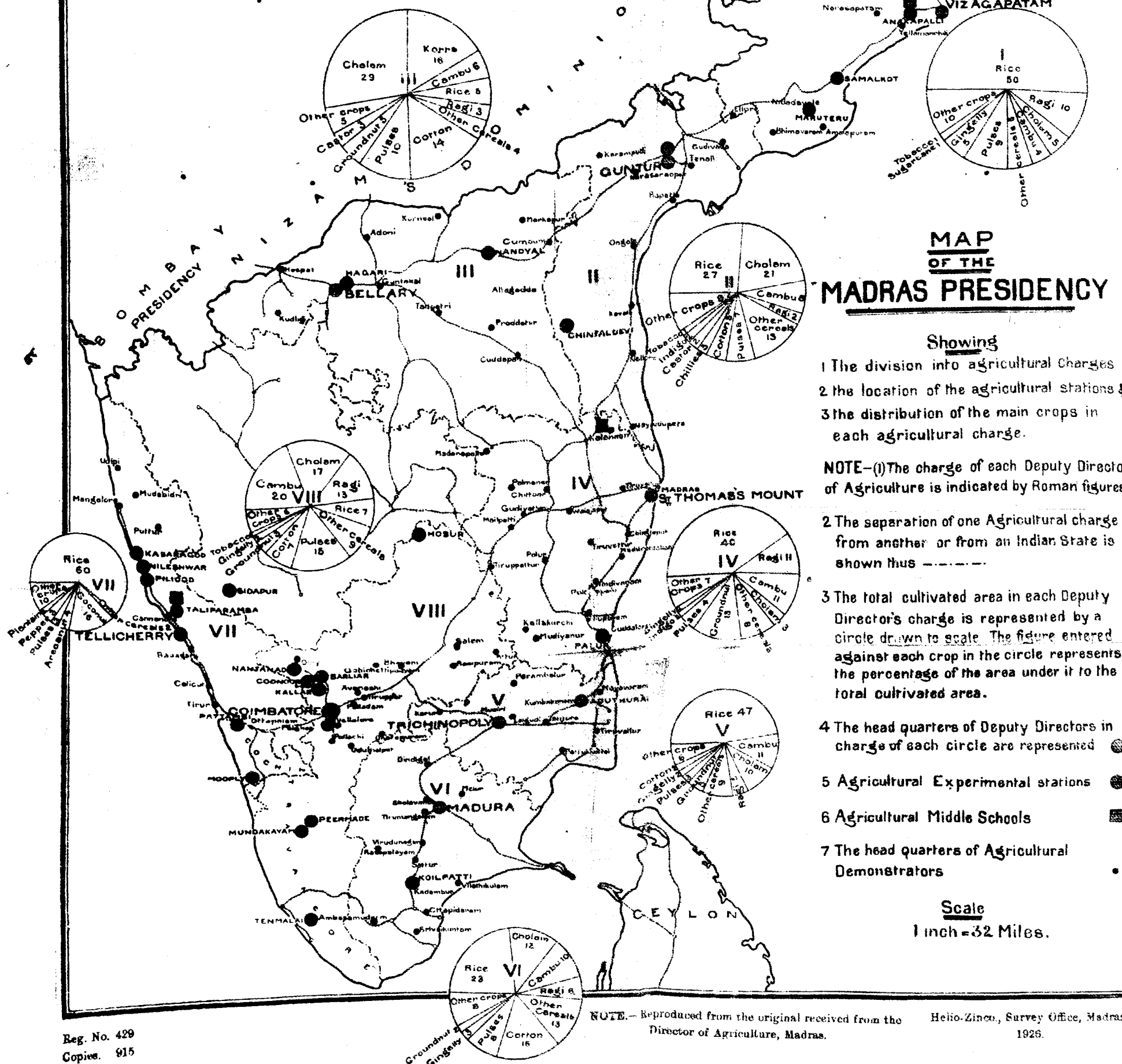
(Figures in thousands of acres, i.e., 000 being omitted.)

Crop.	1st division.	2nd division.	3rd division.	4th division.	5th division.	6th division.	7th division.	8th division.
	ACS.	ACS.	ACS.	ACS.	ACS.	ACS.	A. S.	ACS.
Paddy ...	3,512	1,298	382	1,882	1,410	1,049	1,488	300
Cholam ...	318	1,061	2,121	147	289	547	...	701
Cumbu ...	368	892	471	488	346	454	...	847
Ragi ...	685	117	280	498	138	267	...	515
Korra ...	...	...	1,165	...	...	...	...	...
Other cereals ...	228	644	298	383	270	572	28	387
Pulses ...	662	228	725	190	97	357	71	686
Groundnut ...	380	...	...	103	57	113	...	71
Gingelly ...	...	...	351	602	169	80	...	138
Groundnut ...	...	...	...	...	...	...	282	...
Coconut ...	...	119	198	...	...	...	...	...
Castor ...	...	128	...	...	...	1	71	...
Chillies ...	...	...	...	...	...	...	...	...
Pepper ...	48	...	...	...	60	708	...	308
Sugarcane ...	...	230	1,045	54	...	...	...	...
Cotton ...	...	96	...	...	...	...	...	87
Indigo ...	63	63	...	...	...	...	90	...
Tobacco ...	...	...	...	...	...	...	44	...
Arecanut ...	...	...	...	...	...	...	248	...
Plantains ...	...	44	349	295	198	360	...	255
Other crops ...	720	...	...	...	...	...	...	...
Total ...	6,844	4,915	7,260	4,614	3,024	4,502	2,412	4,189



DIVISION INTO AGRICULTURAL CHARGES

- I Ganjam Vizagapatam Godevari Agency Division and the Northern Taluks of Kistna Narasapur Bhimavaram Tanuku Ellore and Yerna gudem
- II Kistna Except the Taluks in I above Guntur and Nellore
- III Kurnool Bellary Anantapur and Cuddapah
- IV Chittur North Arcot Chingleput and South Arcot
- V Tanjore and Trichinopoly
- VI Madure Ramnad and Tinnevely
- VII Malabar and South Kanara
- VIII Salem Coimbatore and the Nilgiris



செப்பனிருபவர் பெயர்

செப்பனிருவதற்காக எடுத்த
கொள்ளப்பட்ட நாள

மார்ச்சு. 1943.

செப்பனிரு முடித்த நாள

மார்ச்சு 1943 மே-26

செப்பனிருக்கும்

பா. எ.

கையொப்பம்