REPORT

ON THE

OPERATIONS OF THE DEPARTMENT OF AGRICULTURE

MADRAS PRESIDENCY

FOR THE YEAR

1929-30

MADRAS
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OFFICE OF THE
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From

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OFFG. 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 1929–30.

I.—ADMINISTRATION.

2. Mr. R. D. Anstead, C.I.E., was in charge of the Department till 1st September 1929 when he went on leave preparatory to retirement. I took charge of the Department on that date.

A list of officers in charge of research stations and of circles is given in Appendix I.

A.—STAFF.

Indian Agricultural Service.

3. The recommendations of the Lee Commission having been given effect to during the year, the posts of Entomologist, Agricultural Chemist, Lecturing Chemist, Systematic Botanist and of two Deputy Directors hitherto kept vacant were abolished in G.O. No. 504, Development, dated the 10th March 1930, and an equal number of posts were added to the cadre of the Madras Agricultural Service.

Madras Agricultural Service.

4. *Appointment.*—The designation of Assistant Director of Agriculture was changed to District Agricultural Officer and four new posts were added to the cadre. In addition to these another post of Assistant Entomologist was created.

The following officers were appointed to the Madras Agricultural Service :—

(1) M.R.Ry. M. Kanti Raj Nayudu Garu, Personal Assistant to the Director of Agriculture.
(2) M.R.Ry. M. Mangesh Rao Avargal, District Agricultural Officer.
(3) M.R.Ry. M. K. Nambiyar Avargal, District Agricultural Officer.
(4) M.R.Ry. G. Jogi Raju Garu, District Agricultural Officer.
(5) M.R.Ry. M. U. Vellodi Avargal, District Agricultural Officer.
(6) M.R.Ry. M. Viraraghava Rao Nayudu Garu, District Agricultural Officer.
(7) M.R.Ry. R. Swami Rao Garu, District Agricultural Officer.
(8) M.R.Ry. T. V. Subrahmanya Ayyar Avargal, Assistant Entomologist.

5. *Confirmation.*—Messrs. P. D. Karunakar, Agricultural Bacteriologist, R. Chokkalingam Pillai, Superintendent, Cotton Breeding Station, Coimbatore, K. Unnikrishna Menon, District Agricultural Officer, M. C. Cheriyan, Assistant Entomologist, and T. Lakshmana Rao, Assistant Agricultural Chemist, were confirmed in their appointments.

Temporary gazetted posts.

6. The Government sanctioned the temporary posts of Headquarters Deputy Director of Agriculture, Oil-seeds Specialist and Personal Assistant to the Principal in accordance with the recommendations of the Director of Agriculture in his scheme for the reorganization of the Department. M.R.Ry. Rao Bahadur D. Ananda Rao Garu was appointed to the first post from the 11th November 1929, and

Mr. J. H. Hensman was appointed as Personal Assistant to the Principal from 1st July 1929. The post of Oil-seeds Specialist has not yet been filled.

7. *Non-gazetted executive staff.*—The number of upper subordinates in the Research and Agricultural sections was increased during the year by 16 and 9, respectively, the sanctioned strength at the end of the year being 97 in the former and 171 in the latter.

B.—Buildings, etc.

8. Of the many new works constructed during the year the following were the most important :—

(1) Two Farm Managers' and two maistris' quarters at the Agricultural Research Station, Samalkot.
(2) Quarters for the Cotton Assistant at the Agricultural Research Station, Nandyal.
(3) Barbed wire fencing for the Agricultural Research Station, Hagari, and Paddy Breeding Station, Coimbatore.
(4) Museum and stores at Trichinopoly.
(5) Farm Manager's quarters at Pilicode near Nileshwar.
(6) A permanent isolation shed for cattle at the Agricultural College.
(7) A milking shed at the Agricultural College.
(8) Two stores at the Millets Breeding Station, Coimbatore.
(9) Two quarters for two assistants and two quarters for fieldmen at the Millets Breeding Station, Coimbatore.
(10) A field laboratory at the Cotton Breeding Station, Coimbatore.
(11) A field laboratory at the Paddy Breeding Station, Aduturai.
(12) Two engine sheds at the Paddy Breeding Station, Aduturai.
(13) Quarters for the assistant at the Paddy Breeding Station, Aduturai.

The Public Works Department handed over to the Department all the buildings erected for the Agricultural Middle School at Kalahasti.

II.—AGRICULTURAL EDUCATION.

9. *Agricultural College, Coimbatore.*—The College is affiliated to the University of Madras and affords a three-year course of instruction which leads to the degree of B.Sc. The possession of this qualification or its equivalent is required before employment in the Department can be obtained.

The number of applications for admission to the College this year was 303 as compared with 307 last year. From among these applications 48 students were selected by the Selection Committee, consisting of the principal of the College, M.R.Ry. C. Tadulinga Mudaliyar Avargal, and three non-official members, M.R.Ry. Rao Bahadur T. A. Ramalingam Chettiyar Avargal, Rao Sahib V. Krishna Menon Avargal, and Mr. Kader Moideen Sahib Bahadur, M.L.C.

During the year the number of students actually in attendance was—

Class I—46, Class II—43, Class III—36.

At the examination held in 1929, 45 students appeared for Part I of whom 34 passed, one in the first class, and 44 for Part II of whom 33 passed, all in the second class.

Of the five scholarships awarded to students of the first year only four could be given, as a suitable candidate for the fifth scholarship could not be found. This scholarship was therefore awarded to a deserving student of the second year. The Pentland scholarship and the scholarship for the best student of the first year were both awarded.

In addition to the usual lectures delivered by the teaching staff, 25 lectures were given by the Statistical Assistant to the Director of Agriculture, Research Officers attached to the Research Institute and an Honorary Reader to the University of Madras.

The usual College Day Celebrations were held in July.

10. *Agricultural Middle Schools—Taliparamba.*—This school continued to function during the year. At the beginning of the year the number of boys attending the second-year class was 14, instead of 19, and 17 boys were admitted to the first-year class. At the end of the year there were still 14 boys in the second-year class

but the number of boys in the first-year class had dwindled to 9. All of the 14 final year boys obtained certificates.

This school was opened in 1922 as an experiment. Its purpose is to provide, for the sons of cultivators, a vernacular course of instruction in the principles of agriculture, with special reference to the conditions of the tract in which the school is situated. The intention is that the boys who attend the school shall go back to till the land and shall be better cultivators than their fathers. The school is capable of accommodating 20 pupils in each class.

With the passing out of this last batch of students the school completes eight years of its existence and has trained seven lots of students. During that time 156 students were admitted, out of whom 104 completed the course. Of these, omitting the recent batch of 14 who have not had time to settle down, it is known that about 35 are engaged in work of the nature of farming, 22 are engaged as teachers or are still receiving ordinary education, 26 are not employed, 5 we have no information about, and 2 are engaged as fieldmen in Government employ. The results of the experiment are that the school has never been filled, that on the average not more than two-thirds of the boys who join the school complete the course and of those who do about one-third only (on the average 5 per annum) actually take to farming. The conclusion is that this type of agricultural education does not appeal to the cultivator.

11. *Usilampatti.*—This school which is under the management of the District Board was opened during the year. It is primarily intended for the benefit of Kallars. The agricultural staff are lent by this Department and Government gave a grant of Rs. 13,909 in 1928–29 and Rs. 6,160 in 1929–30. During the year 14 boys of whom 13 are Kallars joined the school.

12. *Farm Labourers' Schools.*—The schools for juvenile and adult farm labourers at Anakapalle, Coimbatore and Palur were continued during the year.

At Anakapalle there were 33 boys in the day school as against 40 last year and 22 adults in night school as against 19 last year.

At Coimbatore there were 10 pupils in the day school and 12 in the night school at the beginning of the year. At the end of the year these numbers had dwindled to 8 and 11 respectively.

At Palur the figures for attendance was 14 in each school as against 15 in the day and 10 in the night school last year.

The object of these schools is to provide general and agricultural education for the sons of labourers who would not otherwise go to school. They appear to be fulfilling their object

13. *Practical instruction in Agriculture.*—At Anakapalle provision is made on the Research Station for training in practical agriculture for a limited number of agriculturists. The course usually covers two years. At the beginning of the year there were five men receiving such training. During the year three left, two after receiving one year's training and there were two fresh admissions towards the end of the year. The instruction is limited to those operations which form the basis of our propaganda and demonstration work in the district plus what can be gained from popular lectures on agriculture provided by the staff in the evenings.

III.—SEASON.

14. The south-west monsoon commenced early on the west coast and gave fairly heavy rainfall with occasional breaks. In most of the other districts, the monsoon was timely and satisfactory in June but weak in July, August and the first part of September. The monsoon asserted itself in the second fortnight of September under the influence of a depression and a storm in the Arabian Sea and a depression off the Malabar Coast and gave fairly copious and well distributed rainfall. On the whole, the monsoon was fairly up to or above the average in the Presidency except in Guntūr, the Deccan, and the Central Districts (Coimbatore excepted).

15. The North-east monsoon set in fairly early in October by a general precipitation of heavy rain on the 3rd October owing to a depression in the Bay of Bengal. Another depression off the Circars again caused widespread and heavy rain between the 16th

and 18th October. The monsoon was established in the South Bay of Bengal by the 30th October. The rainfall in the month was up to or above the average except in Kistna, Guntūr, the Carnatic, North Arcot, Salem, Coimbatore and Madura. The monsoon was active in the Presidency (Circars and the west coast excepted) in the first fortnight of November under the influence of (i) a depression in the south of the Bay of Bengal on the 3rd November and (ii) unsettled conditions in the neighbourhood of Ceylon between the 12th and 14th. Another depression on the 1st December in the neighbourhood of Negapatam caused on the first three days of the month wide spread rain which was heavy in Cuddapah, Carnatic, Central and Southern Districts. On the whole, the North-east monsoon was generally up to or above the average except in West Gōdāvari, Kistna, Guntūr, Nellore, Coimbatore and Madura.

16. The effect of the season on the crops at such of the Agricultural Stations as have been affected abnormally is described below :—

At Anakapalle, the yield of sugarcane was reduced by drought, while at Samalkot, the shortage in rainfall kept the sugarcane and plantain fields free from water logging and contributed to a good harvest of both the crops. At Guntūr all crops gave record yields as a result of cultivation with improved ploughs followed by repeated intercultivation in spite of the less favourable season.

The Buffalo Breeding Station, Guntūr, had very little grazing owing to the shortage in rainfall.

At Nandyal also, although the rainfall was less than in the previous year, all crops, especially cholam and cotton, gave high yields as the rain was well distributed over the area.

At Hagari, though the aggregate rainfall was more than in the previous year, the season was unfavourable for *Mungari* or early crops which were not sown in consequence ; but the *Hingari* or late sown crops had the full benefit of the rains and the yields were above normal.

At Pālūr, heavy rains in November followed by further showers in December and January caused bad fertilization and shedding of seeds and thus reduced the yield of paddy.

At Kovilpatti, the season was good for pulses and fodder, fair for cotton and bad for cumbu.

At Taliparamba, the rain was a little too much for pepper, especially in September and caused the shedding of a large number of spikes. All other crops were benefited by the heavy rains.

At the Central Farm, Coimbatore, the season was not, on the whole, satisfactory.

Rain-fed cotton on the Cotton Breeding Station suffered from drought.

At Nanjanad, the second crop of potatoes suffered from drought and the third crop was damaged by frost in December and January.

IV.—RESEARCH.

17. The research work carried on by the Department is the most important of all its activities. On the results obtained by this work are founded the instruction imparted at the Agricultural College and other institutions and the demonstration work conducted in the districts. It is in fact the foundation on which the whole fabric of the Department rests.

The primary purpose of all the research work is the acquisition of exact knowledge. The ultimate purpose is the translation of this exact information into a definite recommendation which the cultivator can adopt as part of his ordinary farming practice and which if adopted will result directly or indirectly in a higher return from the land. However much the actual research work may appear to be divorced from practical farming this ultimate object is always held in view.

A.—Botany.

18. The work of the Systematic Botanist falls into two divisions, routine and special. Routine work includes identification, collection and preservation of specimens, exchange of duplicates, loan of specimens to recognized institutions and individuals, revision and monographing of particular groups of plants, despatch of Madras specimens to institutions for correct identification and lastly the supply of information on the value, economic or otherwise of plants.

Special work includes the critical study of particular groups of plants of scientific and economic importance and the publication of the results of such study, the survey of the vegetation of the districts of the Presidency and the preparation of district flora, the ecological survey of types of vegetation, the survey and mapping of the grass lands of the Presidency and the survey and mapping of the plants poisonous to man and animals.

For the proper conduct of this work, living as well as dead specimens are necessary. The herbarium should therefore, be run in conjunction with a well-stocked Botanic Garden.

During the year 2,520 specimens were identified and 6,730 specimens were acquired by collection and by exchange with Kew, California, Boston and South Africa. Six hundred and thirty specimens were mounted and 704 sheets were added to the herbarium. Two hundred and seventy-six specimens were distributed within the Presidency and 2,133 sheets of Madras material and 28 sheets of species of *Carulluma* were loaned to the Director of Kew Gardens and to Dr. F. H. Gravely of the Madras Museum, respectively. Preliminary to the preparation of district flora 36,270 sheets have been re-arranged according to the district in which the specimens were found. A beginning was also made in the formation of a life history herbarium of agricultural crops and of an economic section of the herbarium.

The section has been distinctly active during the year, but lack of staff has limited progress.

B.—Chemistry.

19. The main work of the Chemical Section can be grouped into four divisions, analysis, animal nutrition, plant nutrition and soil sanitation. In addition to this, there is a certain amount of miscellaneous work which does not fall readily into any one of these groups:—

(1) *Analysis.*—The greater part of the work of this division is caused by the activities of the other divisions of this section. A lesser amount of work is done in response to requests from other sections of the Department and a small amount of work is done for

other departments, planters and cultivators. The total number of samples dealt with during the year was just under 5,000, as compared with 3,300 last year, of which 4,800 were derived from sources within the Department. Among the samples received were certain manures the results of the analysis of which clearly indicate the need for some form of legislation to control the sale of manures and fertilisers.

(2) *Animal nutrition.*--At present the work of this division is mainly concerned with the investigation of the digestibility of the food stuffs used in ordinary farm practice and the determination of the ration to be used for different types of animals under conditions of work and rest. The purpose of this work is to be able to provide information which will enable the ordinary cultivator to keep his animals in good condition in the most economical manner. No definite pronouncement can be made as yet, but it seems clear that cholam fodder (of one variety) alone is not sufficient even if fed liberally to meet the requirements of a bullock at rest.

Work on the feeding of minerals to calves, the seasonal variation on the nutritive value of spear grass, *Andopogon contortus*, and the bio-chemical changes which take place in cholam silage is in progress.

(3) *Plant nutrition.*—Under this head are included items of work concerned with seed and soil treatments viewed from the aspect of their effect on plant growth and on the quality of produce obtained from the plant. As in previous years the main line of work followed is the investigation of the effect of manuring on the vegetative and reproductive capacity of the seed obtained from the crop manured. The crop used was sugarcane. The results need to be supported by further experiment.

Further work in the use of sodium nitrate as a manure for paddy was done. The results appear to confirm those of previous years in regard to the unprofitableness of this manure but not in regard to its effect on the physical condition of the soil.

(4) *Soil sanitation.*—Under this head are included investigations of soil treatments and conditions which affect the fitness and efficiency of the soil to produce crops, e.g., the movement of moisture and plant food

in the soil, the mode and rate of decomposition of organic material in the soil, the effect of manures on the physical condition of the soil and so on.

The actual problems under investigation are—

(*a*) The classification of the types of South Indian soils according to the nature and amount of their replaceable bases. For the purpose of this work it has been necessary to work out a new method of determining basic constituents, for the details of which reference must be made to the report of the Agricultural Chemist.

(*b*) The effect of application of sodium nitrate or sodium salts on the clay complex of the soil. The results in the case of sodium nitrate and swamp paddy soils indicate that harmful results are not likely to follow, a conclusion which is rather at variance with that reported last year. In the case of soils intermittently irrigated with water highly impregnated with sodium salts the results of the investigation are in accord with the known deterioration which takes place in soils so treated. Whether the same result would follow and if so after how long a period, with occasional applications of sodium nitrate to soils intermittently irrigated with sweet water is however still a matter for investigation.

(*c*) The effect of repeated application of manures over a long period. So far as this investigation has proceeded the evidence indicates that this treatment affects the basic composition of the clay and therefore the general condition of the soil.

(*d*) Conservation and movement of moisture in soil. This investigation is being carried out at Hagari and at Coimbatore in respect of black cotton soils. It has not yet reached a point where any pronouncement can be made.

(*e*) The nitrification of green-manure, cattle-manure, and ammonium sulphate and the movement of nitrates in the soil. The results so far obtained show that active nitrification takes place in the first foot of soil and that there appears to be no movement downwards of nitrates.

(*f*) The effect of drainage on the betel vine. The results of this investigation are in accord with those

obtained in previous years and show that improvement in the drainage of the soil improves the condition of soil for growing betel and results in a better crop.

(5) *Miscellaneous.*—Work on the problem of devising a method for rendering soluble the phosphate of Trichinopoly phosphate was continued. The method under test is to make a compost of soil, farm-yard manure, sulphur and finely ground phosphate. After 45 days 5 per cent of the phosphate is rendered water soluble and 75 per cent citric acid soluble. The effect of the mature compost on plant cultures is being tested.

The bacterial examination of the milk produced at the dairy at Coimbatore and that bought was continued. The results show that it is possible in this country to produce a high grade of milk.

An investigation of the possibility of substituting a less objectionable method of preparing ginger for export, than the traditional sulphur-di-oxide method was carried out. It was discovered that drying in the sun combined with treatment with milk of lime results in a satisfactory product.

C—Crops.

20. Research work on crops follows two main lines, plant-breeding and agronomy. Plant-breeding work has, as a rule, three stages, the isolation of the different strains which go to make up the local mixture, the identification of the different characters found present and a study of their inheritance and lastly the crossing of one strain with another with the object of obtaining strains of higher economic value. The first two stages are frequently taken together and from the results of the first are usually obtained the earliest strains which prove themselves to be more profitable to cultivate than the local mixture.

Agronomic work deals with all those factors which affect the cultivation of the crop in the field, seedrate, spacing, manuring, time of sowing, place in the rotation and so on.

(1) *Cereals.*

21. (*a*) ***Millets.***—The greater part of the work on millets is being carried out by the Millet Specialist on

the Millet Breeding Station at Coimbatore and in co-operation with the Deputy Director of Agriculture, III Circle, on the Research Stations at Hagari and Nandyal. Some plant breeding work on ragi, *Eleusine coracana*, is being done on the Research Station at Anakapalle and a small amount of agronomic work on the other stations which are not devoted to work on swamp paddy.

The chief millets being dealt with are cholam, *Andropogon sorghum*, cumbu, *Pennisetum typhoideum*. ragi, and tenai, *Setaria italica*. The plant-breeding work in progress is just passing through the first two stages. In cholam two strains of the yellow variety, one N. 23/10 suitable for use on the black rain-fed soils of Kurnool and one A.S. 809 for irrigated conditions in Coimbatore district and one white A.S. 1543, also suitable for growth under irrigation in Coimbatore district have been isolated and have shown themselves under the conditions of the respective Research Stations, to be superior yielders to the local crop. They are now ready for trial under ordinary cultivators' conditions.

In ragi, E.C. 47 to which reference was made last year, is undergoing its test in the district.

A considerable amount of work on the inheritance of characters in all of these millets has been done an account of which will be published shortly.

The main agronomic work carried out during the year was the testing of an application of Ammonium Sulphate plus Superphosphate on cholam and cumbu. The plots were laid out not only on the Research Stations but also on ryots' lands. The results vary as was expected ; further than this nothing can be said.

(*b*) *Paddy.*—As in previous years the main work on this crop is carried out by the Paddy Specialist on the Research Stations at Maruteru, Vedapatti, Aduturai and Pattambi. In addition to this, breeding and agronomic work is being done on the Research Stations at Anakapalle, Samalkot and Palur. There is little to report this year as to the actual work, as this was described in considerable detail last year and no new lines have been embarked upon. A word must, however, be said about the present position and its effect on our work in the future.

There has been a very definite drop in the price of rice and so far as can be seen from an examination of the world position there is no hope of a rise in the near future. It is therefore necessary that our work on this crop should be directed towards discovering means of reducing the cost of production and where possible of altering the system of cultivation to permit of other more profitable crops being grown in rotation with it.

(2) *Fibres.*

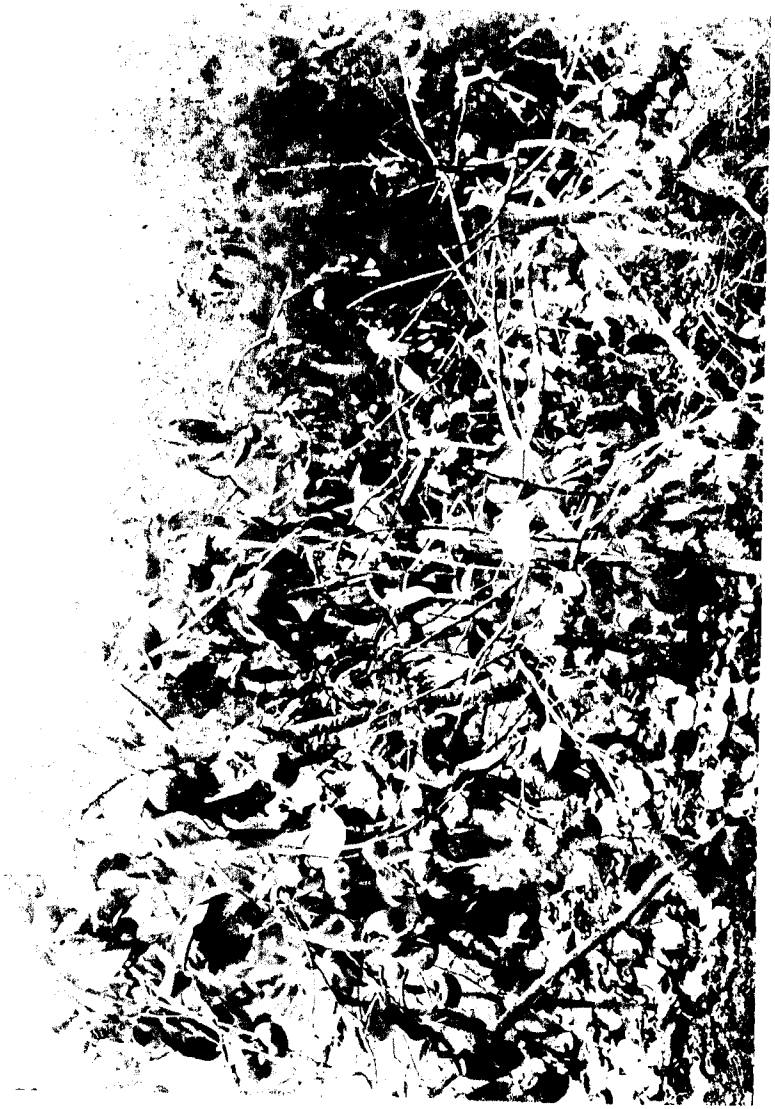
22. The chief fibre crop which is receiving attention is cotton, work on which is being carried out on the Cotton Breeding Station at Coimbatore and on the Research Stations at Koilpatti, Hagari, Nandyal and Guntūr.

So far as breeding work is concerned there is little to report. Work at Koilpatti and Guntūr shows promise of producing a new strain of *karunganni* higher in yield and giving produce of better quality than the present strains and the first good strain of *cocanadas*. Both of these are nearly ready for trial under cultivators' conditions.

Agronomic work at present is mainly concerned with spacing, time of sowing, manuring and water requirements. Most progress has been made with the research into time of sowing of Cambodia which has now been in progress for three seasons. Each year a comparison has been made between sowing on the 1st September and on the 1st October. Each year the earlier sowing has given a very definitely heavier yield. Over the three years the earlier sowing has given an average yield of 1,080 lb. of seed cotton per acre as compared with 622 lb. from the later sowing. The greatest difference was 780 lb. and the least 270 lb. Detailed examination of the plant this year showed that the earlier sown plants produced on the average 13 flowers per plant and set 2·5 bolls while the later sown plants produced on the average one flower less and set one boll less.

(3) *Fodders.*

23. The solution of the fodder problem is the key to the solution of the wider problem of bringing about



PERSIMMON DAI DAI MARU, PHOTOGRAPHED AT THE POMOLOGICAL STATION, COONOOR

a general improvement in ordinary farming practice. A partial solution of this problem would be achieved if it were more generally realized that the quantity of cattle-manure produced on a given holding is more a function of the amount of fodder fed and of litter used than of the number of cattle owned. This would lead to the gradual elimination of the unnecessary cattle now being kept and would ease the situation for the necessary cattle. This is not all, it is still necessary to increase the yield of fodder to provide a sufficiency of feed for the cattle which must be kept and to supply more litter in order to increase the amount of cattle-manure for which there is such dire need. It is to this aspect of the question that research work is being directed.

This work follows two main lines, the testing of kinds and varieties and the testing of methods of manuring. The kinds of fodders under test are divisible into two classes, annuals and perennials. Among the annuals cholam is the most common fodder in use. Cumbu is now being tried and is showing distinct promise of being a useful fodder.

Among the perennials Guinea grass, Elephant grass and Lucerne find a place as usual.

The most pleasing feature to report is the beneficial effect which a dressing of Ammonium Sulphate and Supers had on cholam. Quite large increases of yield were obtained and if future results follow the same course the possibility of solving fodder question will not be so hopeless.

(4) *Fruit.*

24. Work on fruit is in progress at the Pomological Station at Connoor, the two subsidiary stations at Burliar and Kallar and at the Research Station at Samalkot. The first three stations are on the Nilgiri hills and stand respectively at elevations of 5,800, 2,800 and 1,400 feet. The last named station is a plains station and stands practically at sea level. Plantains are the only fruit crop grown at this station. At Coonoor temperate and sub-tropical fruits are dealt with while at Burliar and Kallar tropical fruits alone are grown. At Kallar the work is greatly hampered by pests, the depredations of wild animals, monkeys, pig and deer,

the poor quality of the labour and the fact that the area is so malarial that no one can live at the station.

At Coonoor, the yield of fruit was not quite so good as last year, but plums, variety Rubio, Hale, Alu bokara, Shiro and Kelsey; Oranges, variety Jaffa and Washington Navel; Persimmons; Cherimoyers; Cape gooseberries; Tomatoes; Guavas, strawberry and small yellow; Passion fruit and Feijoa sellowiana are now coming into bearing and give distinct promise of being useful additions to the list of fruits capable of being successfully cultivated on the hills. Small quantities of Grape fruit were marketed in Madras.

At Burliar, the Mangosteen crop was poor, as was expected after the heavy crop obtained last year. Six plants of Aleurites fordii, the Tung oil plant, were planted and appear to be thriving.

At Kallar, a wind storm in April did a considerable amount of damage. At this station Plantains, Oranges, Papayas, Pine apples, Mangoes and Guavas continue to give satisfactory results. The young Mangosteens are now very promising.

(5).—*Oil-seeds.*

25. (1) *Coconuts.*—Work on this crop continued on the lines indicated in last year's report. The results obtained at Kasaragod have now reached a point where it is possible to arrive at conclusions. For the present these must be limited to two, that clean cultivation has a beneficial effect on the yield and that the yield from year to year varies with the hot weather rains of the previous year. It is fairly safe to say that given proper spacing from tree to tree, the efficient eradication of weeds and ample supplies of organic matter to improve the moisture retentiveness of these very light soils very satisfactory yields of nuts would be obtained. It has been the practice in the past to burn a large proportion of the leaves annually collected from the trees. An experiment is now being made to see whether the less woody parts of the leaves will rot in a reasonable time and so supply the organic manure which is needed and of which supplies are short.

(2) *Groundnuts.*—Work on this crop was continued at Palakuppam on the lines indicated in last year's report. There is as yet little to report. The

spacing experiments indicate that the local spacing 9″×6″ for the spreading type and 6″×6″ for the bunch type are correct for the conditions prevailing on this station.

(6) *Root-crops.*

26. *Potatoes.*—Work on this crop is carried on at the Research Station at Nanjanad and for the present is chiefly concerned with the testing of varieties and the investigation of the most economical method of manuring. In regard to the latter line of work it has been found that by the liberal use of cattle-manure and artificial manures heavy crops can be obtained. The average yield obtained this year was the highest on record 7·5 fold, i.e., about 7·5 tons to the acre as the seed rate is about 1 ton to the acre.

(7) *Spices and condiments.*

27. *Pepper.*—Work on this crop at Taliparamba was continued with little better results in the control of "pollu" disease.

(8) *Sugarcane.*

28. Work on this crop is mainly confined to the Research Stations at Anakapalle, Samalkot and Palur. The chief items under investigation are varieties, manures and methods of manuring, methods of cultivation and rotations. The manurial work is mainly directed towards discovering what effect the partial or total substitution of Ammonium Sulphate for oil-cake has on the crop. It would appear that at all three stations a partial substitution can be made with advantage to the return obtained from the sugar-cane crop itself. What the effect of this on the succeeding crop of ragi or groundnut is, has yet to be determined. Among the results obtained from the other lines of work, the most interesting is the effect of varying the supply of water from which it would appear for the conditions prevailing at Anakapalle that the amount of irrigation water necessary to mature a crop can be reduced to one irrigation given at the time of planting.

D.—Entomology.

29. As usual the report of the work done by the Entomological section is a long one and it is impossible to deal with it adequately within the limits of this report. A new terror has been added to his life by the knowledge that the coffee beetle *Stephanoderes*, against which pest I proposed just five years ago that preventive measures should be taken, has been found in Southern India. Against this it is satisfactory to be able to report that the difficulties encountered in breeding parasites of the *Nephantis* pest of coconuts and of the Fluted Scale have been successfully overcome. For a proper appreciation of the work of this section it is necessary to refer to the report itself.

E.—Horticulture.

30. Under this head falls the account of the work done at the Botanic Gardens at Ootacamund and Coonoor.

A Botanic Garden has several purposes to serve. It is a place of resort, for those who like to be in the pleasant surroundings evolved from a happy combination of grass, trees and flowers and who without being desirous of seriously studying the components of such surroundings can appreciate the artistic effects produced. It is an educational institution; it provides a visible demonstration of what can be done with land, shrubs, trees, grass and flowers and of the conditions under which different kinds of plants thrive; it is a collection of living plants to which the serious student of botany can refer and if the Garden boasts of a reasonably good herbarium within its bounds affords him an opportunity of close study of any particular family or genus in which he is interested as the herbarium will contain preserved specimens of members of the family or genus which cannot be grown in the garden. It is a research laboratory because one cannot maintain a collection of plants culled from all parts of the globe without discovering which will thrive without much attention, which have to be humoured and in what way before they will agree with their surroundings and which will not thrive no matter what is done, and because plants of economic value are

introduced into the garden with the definite purpose of discovering whether they will thrive and what is the best way to handle them. The limitations of this work are not so narrow as those of a crop specialist who deals with a single crop. The range covered can be very wide indeed if the necessary equipment of land and buildings is provided.

As pleasant places of resort the gardens at Ootacamund and at Coonoor serve this purpose admirably. As educational institutions they are handicapped by lack of space, of staff and of a good herbarium. As research laboratories they have suffered in the same way and because much of the time of the staff is taken up in producing plants, seeds and flowers for sale. During the last two years an average of over Rs. 6,000 per annum has been obtained as receipts from the sale of plants, seeds and flowers from these two gardens. This clearly indicates that there is room for private enterprise to take on these duties of florist, seedsman and nurseryman at present performed by these Government institutions. Considering that the care of these two gardens and all that this involves represents about one-quarter of the Curator's work he is to be commended on the results he has achieved. Equipped with a good herbarium, with an increase in staff of the right kind, an expansion in space and shorn of their activities devoted to the mere making of money these gardens have much greater possibilities for useful service than have as yet been realized.

F.—Implements.

31. Research work on implements is mainly carried out by the Research Engineer. During the year his work has been concerned chiefly with the testing of ploughs and of the wearing qualities of share points. As a result of his work we are now in a position to limit the range of ploughs generally suitable for non-swamp-paddy conditions to two types, a light plough of the Meston type and a medium plough of the Monsoon, Chattanooga or Punjab type. These are for ordinary conditions where the draught is limited to one pair of poor bullocks or one pair of reasonably good bullocks respectively. We hope shortly to be able to add a third type, suitable for swamp-paddy conditions, to this

range. The tests with share-points showed that points with a heavy chill on both sides gave respectively 50 per cent and 65 per cent longer service than those with a medium chill or a light chill on one side only. As the price in all cases is the same the first named type is obviously the cheaper article.

Another item of work which has received considerable attention is the construction of an improved type of bullock yoke. A suitable design has been worked out, but like most other contrivances which are to be placed before the cultivator for his acceptance it has to be made to a price before its greater mechanical efficiency will appeal. As its competitor is a log of wood this is the more difficult part of the problem.

Other activities of this section were the testing of a potato digger at Nanjanad, the trial of different makes of bullock-driven sugarcane mills and chaff-cutters and further investigation of the problem of producing a simple and cheap automatic seed-drill.

An improved type of *guntaka*, designed by Mr Munro and myself in 1927 which has been under test and which has been held back pending the completion of arrangements for its manufacture at a low price is now on sale, arrangements having been made for its manufacture in India.

G.—Livestock.

32. (*a*) *Cattle.*—Work on cattle is directed towards the establishment of high class herds of the two local breeds, the Ongole and the Kangayam of the extra Madras breed the Scindhe and of a new breed to be evolved from the cross between the Ayrshire and the last mentioned Indian breed.

In the case of the first two breeds an improvement in type from the draught point of view and an improvement in milking capacity are aimed at. In the case of the Scindhe milking capacity is the first consideration. In all three cases we have in view the production of a number of bulls of good type for sale, with the ultimate object of bringing about a general improvement in the cattle of the Presidency.

In the case of the cross-bred herd the object is to try and evolve a type of animal with the milking capacity of the Ayrshire and the constitution of the indigenous animal.

CHATTANOOGA 17 SERIES POTATO DIGGER PLOUGH AT NANJANAD AGRICULTURAL RESEARCH STATION

It is a matter for regret that progress must be slow. We cannot alter the course of nature and cause the animals to be much more prolific or cut down the interval which must elapse between one generation and the next. It takes 7 or 8 years to establish a pure strain of a cereal crop where self-fertilisation is possible, where a generation can be obtained once a year and where the progeny of the first generation numbers hundreds and that of the second and subsequent generations can be numbered in thousands. It must, therefore, of necessity take very much longer to establish a good strain of cattle when the cow does not always give one calf once a year and when it takes three years at least before that calf in turn reproduces itself.

The Ongole herd was started in 1920 by the purchase of 46 cows and 5 bulls and the Kangayam herd in 1924-25 by the purchase of 30 cows.

That we have now 14 Ongole cows which have given 4,000 lb. or over of milk and six Kangayams which gave more than 2,500 lb. of milk in their last lactation and that we have put out for breeding purposes 36 Kangayam bulls and 75 Ongole bulls is evidence that we are making full use of the means at our disposal.

(*b*) *Buffaloes.*—A small herd of buffaloes is maintained at the Buffalo Breeding Station attached to the Agricultural Research Station, Guntūr. The policy here is to produce for distribution a number of cross-bred buffaloes obtained by mating the Delhi buffalo with the local animal. The object is to grade up gradually the local breed and improve it in size and milking capacity. This is fairly straightforward work and is proceeding satisfactorily. One cross-bred buffalo gave 4,517 lb. of milk with a daily average of 16·7 lb. and in her present unfinished lactation over 117 days has given a daily average of 16·9 lb. five others have averaged 3,453 lb. of milk with a daily average of 11 lb.

(*c*) *Sheep.*—A flock of about 250 Bellary sheep is maintained at the Livestock Research Station, Hosūr. The object here is to improve the yield of wool. The average clip this year was 2 lb. 5 oz. as against 2 lb. 6 oz. last year. The best clips, from rams were 7 lb. 8 oz. and 5 lb. 4 oz. respectively.

(*d*) *Pigs.*—A small herd of pigs is kept at Hosūr. This year 21 were sold for breeding purposes.

(*e*) *Poultry.*—Flocks of White Leghorns, Rhode Island Reds and Light Sussex are maintained at Hosūr and at Coimbatore in order to supply eggs for hatching and birds to the public. Two hundred and thirty-eight birds were sold and 2,505 eggs were issued and sold for hatching. This section of the live-stock work will be expanded as soon as the subordinate who has been sent to Lucknow to be trained, returns.

II.—Mycology.

33. The activities of the Mycological section continued to be directed towards the investigation of fungoid diseases of economic crops with the object of discovering cheap and efficient means of controlling these diseases.

As in last year paddy blast *Piricularia oryzæ* and the mosaic disease of sugarcane were kept under close study. In the case of the first disease endeavours are being made to find which strains of paddy are resistant, what factors are concerned in causing resistance, whether the application of any manure to the crop will contribute towards resistance and whether drainage is a factor of any importance. So far the most that can be said is that strains G.E.B. 24, Co. 1 and Co. 4 maintain their resistance to this disease.

In the case of mosaic disease the lines of investigation being followed are, a study of the resistance of varieties, a search for a possible insect vector, a study of the histology of the plant and the testing of different methods of seed treatment. It was found that Co. 205, Co. 214, Co. 244 and Kassoer appear to be resistant to the disease.

In addition to this work the study of diseases of cotton, groundnut, cholam, coconut and pepper and a host of minor investigations were made during the year.

I.—Trial Plots.

34. As the purpose of all our research work is to supply the cultivator with information which he can make use of on his own holding, all our discoveries are

first of all tested on the Research Stations until a definite result is obtained. Conditions on a Research Station are of necessity in many respects different from those which prevail on the ryot's holding. It is therefore necessary in many cases to determine whether we shall get the same result on the ryot's holding as on the Research Station or whether the result will be modified. In any case, we desire to be in a position to say that this crop, this method of cultivation, this manure, etc., etc., will give an increased return per acre of approximately so much. This information can be obtained only by repeating the experiment on the ryot's holding and carrying it out with the same care. This procedure will be adopted in future and in order to distinguish this line of work from the research work carried out on the Research Station and from the demonstration plots we have adopted the name "trial plot" for this type of experimental plot.

V.—DEMONSTRATION.

35. A discovery having been made in the laboratory or in the field and having been tested in the field under the conditions of a Research Station and again under the conditions of an ordinary cultivator's holding and having been found to be of practical value to the cultivator, it remains to bring it to his notice in the area for which it is suitable. This chapter is devoted to an account of the means adopted in doing this, or the items of propaganda and of our success in carrying on the work.

36. The agency employed to bring the results of our research work to the notice of the cultivator is the Agricultural Demonstrator whose approach is either direct or indirect through some other organization such as a Co-operative Society. The means he adopts in carrying out his work are demonstration plots and exhibitions, stationary and movable.

A.—Demonstration Plots.

37. Some confusion has prevailed in the past and I fear still prevails as to the precise purpose of the demonstration plot. Its real purpose is of course to

demonstrate a proved fact, not to elicit the fact, which is the function of the experimental plot on the Research Station and the trial plot in the district to which reference has already been made. It is, therefore, not necessary to give the same meticulous care to these plots as in the case of trial plots nor is it necessary always to record the yields but it is necessary to see that the demonstration has a fair chance of success and that the cultivator is really interested and does most of the work himself. The cultivator no doubt feels that he is carrying out an experiment just as the small boy at school feels that he is carrying out an experiment when he is provided with a test tube containing lime-water and a length of glass tubing and is told to place the latter in the former and blow through it and watch the clear liquid turn cloudy, but the demonstrator should feel like the teacher, certain of the result. The number of demonstration plots which a demonstrator can supervise is therefore greater than in the case of trial plots but there is a limit and it is better that he should have a few carried out under proper conditions to which he can bring the cultivators in the neighbourhood to inspect than that he should have a large number some of which will fail because of conditions not really relevant to the demonstration such as the failure of the cultivator to carry out a necessary operation at the right time. A re-arrangement of the demonstrator's work has therefore been made in order to permit of this being done.

The number of demonstration plots arranged during the year runs into hundreds, the majority of which were successful.

B.—Exhibitions.

38. As usual the more important of the fairs, conferences and festivals held in each district were attended and exhibits were shown and lectures given. The total number of such occasions amounted to over 200. Considerable inconvenience was felt in several cases by the shortness of the notice given by the organizations concerned. It is no light undertaking to arrange for an exhibit and to prepare a course of lectures in conjunction therewith, and a great need is felt for a separate section in each circle to take on

this side of our propaganda work. It is impossible for the touring officer to keep exhibits up to date and prepare them in that variety and in the condition of attractiveness that will enable interest to be kept up and the maximum amount of effect to be achieved. It is useless to continue for long periods with the same exhibits and the same method of arrangement and the same manner of presentation of the subject. The same idea must be conveyed in different ways as both the audience and the lecturer get stale and lose interest. Much more would be done if we had the staff and the equipment necessary.

39. Under this head, reference must be made to the exhibition vans of which there are two for the Presidency. They create a stir in the village which is good but the same criticism applies to them as to the exhibitions. An assortment of exhibits which are not changed leads to staleness and lack of interest. The best use to make of these vans would appear to be to equip them with exhibits and lecturers to convey information on one or two subjects only and send them out on ten-day tours. After each tour the vans would return to headquarters to be refitted with fresh exhibits illustrating some other subject and would then be sent out again.

C.—Items of Propaganda.

(1) *Crops.*

40. *(a) Methods of cultivation.*—Apart from the use of more efficient implements which will be dealt with under that head the main items of propaganda here are drill sowing of cotton, the reduction of the seed-rate used for sowing paddy seed-beds, the planting of sugarcane in lines, and the time of planting plantains.

Drill-sowing of cotton.—This work is chiefly confined to Tinnevelly district where 18,000 acres of crop were drilled this year as against 16,000 last year.

Reduction of seed-rate.—This work is being carried on in nearly every district wherever there is staff and paddy is grown. This is one of the oldest of our items of propaganda and steady progress continues to be made.

Line-planting of sugarcane.—This improvement is accompanied by a reduction in the seed-rate. Most work on this item is being done in the I Circle where the area so planted increased from 1,600 acres to 2,400. Some progress was also made in the III and IV Circles.

Time of planting plantains.—In the I Circle the usual time for planting this crop is from November to February and the crop is allowed to stand for two or more years. This procedure results in the bunches coming to maturity in 12 to 15 months. By planting in May-June and by intensive cultivation bunches can be obtained in from 5 to 6 months after planting. The area so planted increased this year from 3,800 acres to 5,300 acres.

(b) Methods of manuring.—The crops affected here are mainly paddy and sugarcane. In the case of paddy the procedure recommended is the growing of a green-manure crop to be puddled into the land at the rate of about 4,000 lb. of green stuff per acre plus an application of phosphatic manure of from 1 to 2 cwt. of bone-meal or its equivalent in supers, ammophos, etc. Progress is steady and satisfactory.

In the case of sugarcane we are chiefly concerned in persuading the cultivator to continue the use of oil-cake and dissuading him from completely substituting mineral manures for cake. We may not be absolutely right in doing this but in the present state of our knowledge on this point which is gradually being increased, and in view of the general need for organic matter which prevails it is a safe line to follow.

Seed.—The demonstration of the value of pure strains of cotton, cholam, paddy and ragi and the maintenance of a supply of good seed of these strains and of other crops such as coconuts, potatoes and sugarcane continue to form the heaviest part of our propaganda work.

Cotton.—The strains of cotton recommended are N. 14 for the Northerns area, H. 1 for the Westerns area, Cambodia Co. 1 and 2 for all conditions where irrigated cotton can be grown, *Karunganni* C. 7 for the Salem area, and *Karunganni* A. 10 and C. 7 for the Tinnevelly area.

In Kurnool district in 1928–29, there were 2,000 acres of N. 14 sown under seed farm conditions from

which 92,000 lb. of seed were obtained and distributed. It is estimated that there were 27,300 acres under this strain in season 1929–30. About 500 bales of this cotton were sold at a premium of Rs. 32 per bale over white Northerns which is equivalent to an added return of Rs. 4 per acre.

In Bellary district the area of seed farms of H. 1 was 7,500 which gave 400,000 lb. of seed of which 370,000 lb. was sold. The area under this strain in 1929–30 is estimated at 160,000 acres. Nearly 1,000 bales of this cotton were sold at a premium of Rs. 14–24 per bale over the local cotton, which is equal to an increased return of Rs. 2 to Rs. 3 per acre.

In the VIII Circle, there were in 1928–29, 1,100 acres of seed farm of Cambodia Co. 1 and Co. 2 from which 294,000 lb. of seed were obtained and distributed. Three hundred candies of lint were sold for seed farm ryots at a premium of Rs. 12 to Rs. 15 per candy, giving an increased return of Rs. 4 to Rs. 6 per acre over and above the increase due to higher yield which is about Rs. 20.

In the same circle, there were 700 acres of *Karunganni* seed farm from which 81,700 lb. of seed were obtained and distributed in the 1929–30 season.

In this circle, groups of ryots, otherwise unorganized, at Gobichettipalaiyam and Pollachi were assisted to gin their cotton in bulk and reserve the seed for sowing. In this way 110,000 lb. of good Cambodia seed were obtained for distribution. In all, in the IV, V, VI and VIII circles about 500,000 lb. of good Cambodia seed must have been distributed directly by or with the aid of the Department.

In the VI Circle, from the 1929–30 crop, 88,000 lb. of seed of *Karunganni* A. 10 and C. 7 were distributed.

In addition to this work of supplying seed of good cottons, endeavours are being made to dissuade the cultivators in the Tinnevelly area from growing the species of cotton known as *pulichai*. This work has been carried on more or less continuously for the last 10 or 12 years and meets with no success as the area under this cotton mixed with varying proportions of *Karunganni* is increasing. Some more drastic action than mere dissuasion is required.

Cholam.—A small but steady supply of T. 1 of Hagari and T. 6 of Nandyal Research Stations is

maintained. During the year under report, 2,000 lb. of each of these strains was distributed. In addition 2,000 lb. of *Kaki jonna* was distributed from Palur Research Station.

Paddy.—The work of distributing seed of the various strains of paddy isolated by the Department continued to increase. The number of strains, the quantities of seed distributed and the areas concerned are too numerous for a detailed account to be given here, for which reference must be made to the reports of the Deputy Directors in charge of circles.

A sufficient indication of the magnitude of this work and of the need for private enterprise to relieve us of it is to be found in the total quantities of seed distributed directly by us or through our intervention in the circles of most importance from this point of view.

I Circle, 310 tons.	V Circle, 1,780 tons.
IV „ 19 „	VII „ 19 „

Ragi.—Work on this crop is for the present mainly restricted to the II and III circles in which a limited supply of T. 8 ragi is distributed every year.

Coconuts.—The IV, V and VII circles are the main areas in which our work on this crop is being conducted. In all, the effect of wide spacing and clean cultivation is being demonstrated and in the two latter, seed-nuts and seedlings are being distributed. Thirty-six thousand seedlings and 2,900 seed-nuts were distributed.

Potatoes.—The demand for good seed-potatoes is in the main limited to the Nilgiri district in which area about 26,000 lb. of seed were distributed by the Curator of the Botanic Gardens.

Sugarcane.—The chief varieties being recommended to the cultivators are J. 247, for the Northern districts and Fiji B, for the Central districts. The work is directed more to the encouraging of the natural spread from cultivator to cultivator than to the actual distribution of setts, though some 20,000 setts were distributed in the VIII Circle. Good progress continues to be made. In the I Circle a very definite part in the establishment of the system of growing a short-term crop for the production of seed has been made.

(2) *Implements.*

41. Our work under this head is chiefly concerned with the demonstration of iron ploughs of which hundreds were held during the year under report. In spite of these, however, the position does not appear to be nearly so satisfactory as it was in 1924-25. It is now two years since we handed over the distribution of ploughs to private agencies and the general complaint throughout the Presidency is that sales have fallen and that the cultivators' needs for spares are not met. So far as it is possible to ascertain it appears that the sales of ploughs and of spare parts have fallen to about half of what they were in 1924-25.

It would seem that our withdrawal from this work was premature and that we ought to have nursed this business for a few years more until the volume of trade had become great enough to ensure that private enterprise would find it worth while to take a keen interest in it. As it is, there are so many ploughs in the market and the sales of each are so low that the cost of distribution per plough forms far too high a proportion of the sale price of the plough.

The supply of efficient implements at a reasonable price is a very important item of our general programme of agricultural improvement. On it depends the reduction in the cost of cultivation, an increase in yield by more efficient cultivation, above all by the eradication of weeds which rob the soil of so much moisture and reduce the return obtained by the use of manures, the improvement of cattle by making it possible to cultivate the land with fewer bullocks which therefore can be fed better and the production of a larger quantity of straw for use as fodder and litter which will result in an increase in the quantity of farm-yard manure which is so badly needed.

With so much depending upon it, it is essential that either the present arrangement must be improved or we must shoulder the responsibility of distributing implements once again.

By limiting the types of ploughs to three, one light and one medium for rainfed conditions and one medium for wet-land conditions and with a simpler accounting system we can do it with much less trouble than we experienced in the past and which was primarily the cause of our giving it up.

Steps are being taken to limit our demonstration work to three standard types.

(3) *Manures.*

42. *Artificial manures.*—Our work here is, as it should be, mainly concerned in giving advice to cultivators on the use of these manures. In spite of a certain amount of adverse propaganda work on the part of ill-advised individuals it is satisfactory to report that the sales of these manures are on the increase. Properly used these cheap manures afford a means of increasing the amount of cattle-manure produced on the holding and those who ban these manures as "foreign" forgetting that Ammonium Sulphate and Superphosphate are made in India as well as in other countries are doing their fellow countrymen a disservice.

Green manures.—The demand for green-manure seeds continues to increase and its intensity is a safe gauge of the success of our work in the introduction of the practice of manuring paddy by means of green-manure crops to which reference has already been made.

This year the total amount of green-manure seed sold by the Department or by agencies known to the Department was about 480,000 lb. This is less than the figure reported last year, but as our policy is to supply seed to areas where the practice is not established and to encourage private enterprise to undertake the sale of seed and the cultivator to grow his own supply this decrease is satisfactory and understandable.

Indigenous manures.—The manures which fall under this head are farm-yard manure, compost, oil-cakes of various kinds and bone-meal.

Farm-yard manure.—Our work here is directed towards the spread of the practice of using earth and litter in the cattle-sheds as bedding for the cattle and the removal at intervals of the raw manure to pits which where necessary are properly protected by a covering of some kind. Progress is being made, but slowly.

Compost.—Our efforts to persuade the cultivator to place in pits, organic materials particularly those

PLOUGHING IN SUNNHEMP WITH SINGLE FURROW DISC PLOUGH AT COTTON BREEDING STATION, COIMBATORE

which cannot be used as litter for cattle, along with the required amount of old compost or cattle-manure as a starter and bone-meal, is meeting with a certain amount of success. At least 250 such pits were filled under our advice with successful results.

Oil-cakes.—In this case our work is mainly confined to advising the cultivator to use oil-cake for profitable crops like sugarcane where other forms of vegetable organic manure are in defect. No records are therefore kept of the amount of cake so used.

Bone-meal.—The use of this manure along with green manure for paddy is being recommended. A certain amount is being used but as its price is higher than that of Superphosphate less is used than would otherwise be the case. So long as phosphatic manure is being used this is not a matter of much moment. The total amount of bone-meal which can be produced in India is about 100,000 tons about one-fifth of the quantity required for the paddy area in this Presidency. It is therefore, quite obvious that if the needs of the cultivator for phosphatic manures are to be met the supply of bone-meal will have to be supplemented by other forms of such manures.

(4) *Pests and Diseases.*

43. Apart from the legislative measures adopted in dealing with pests and diseases, to which reference will be made in the next chapter, advice and help was given to the cultivators in all circles in dealing with such outbreaks as occurred.

Among the diseases dealt with, Red Rot of sugarcane and Smut of cholam continue to bulk largely. This, however, is not surprising as with each additional demonstrator posted to take charge of a taluk fresh areas to which our information has not filtered come under view.

VI.—LEGISLATION.

44. *Cotton Ginning and Pressing Factories Act.*—This Act continued in force during the year. The brunt of the work of inspection fell on the shoulders of the Inspectors of Factories as the Deputy Directors of Agriculture were able to inspect only a few factories. Proposals have been put up for the provision

of a special staff to be responsible for the enforcement of this and other legislative measures.

There are 472 ginning factories and 63 pressing factories in this Presidency. In 12 cases only was it necessary to take legal action in order to enforce compliance with the provisions of the Act. Most trouble is experienced with factories at Bellary and Adoni, where the owners persist in using hessian bags, ropes and stone weights although at Guntakal, Nandyal and elsewhere in the Presidency factory owners find no difficulty in using iron platforms, chains and iron weights.

45. *Cotton Transport Act.*—Under this Act, which continued in force during the year, there are now only two prescribed areas, the Northerns and Westerns area and the Southerns area. The operations of this Act continue to be effective in keeping Cocanadas out of the Northerns and Westerns area but imports of cotton from the Nizam's dominions by road continued to come.

The formation of a single Southerns area has deprived the Tinnevelly cotton of the protection it deserves and has not increased the protection afforded to Cambodia cotton from mixture with cottons from outside the area, though this year there is little evidence that much cotton was brought in.

Licences to import cotton were issued as usual, the details of which are shown below :—

Single licences.—Eleven licences were issued, four for the import of ginned cotton into the Northerns and Westerns area, five for the import of ginned cotton into the Southerns area and one for the import of waste into the same area.

Annual licences.—The table below gives information about the licences issued from February 1929 to January 1930.

Cotton year 1929–30 *(licences which lapsed on 1st February 1930).*

Name of protected area.	Kind of cotton.	Purpose for which licences were issued.	Number of licences issued.	Number of certified copies issued.	Number of certified copies used.
(1)	(2)	(3)	(4)	(5)	(6)
Southerns tract ...	Ginned cotton.	Mill consumption.	10	187	129

Licences, issued from 1st February 1930 to 31st March 1930.

Cotton year 1930–31 *(licences which will expire on 1st February* 1931.)

Name of protected area.	Kind of cotton.	Purpose for which licences were issued.	Number of licences issued.	Number of certified copies issued.
(1)	(2)	(3)	(4)	(5)
Southerns tract ...	Ginned cotton.	Mill consumption.	8	112
Do. ...	Cotton waste.	Do.	1	15

Import by sea.—Ten licences were issued for the import of 1,061 bales of cotton into Tuticorin.

46. *Pest Act.*—Notifications under this Act affecting coconuts, cotton, groundnuts and the *palmyra* palm were in force during the year.

Coconuts.—Control of *Nephantis serinopa.* The notification prescribing the measures to be taken to control this pest in Malabar and South Kanara was re-issued during the year. In Malabar 180,000 palms and in South Kanara 42,500 palms were cleared. There were no prosecutions.

The supplementing of clearing work by the release of parasites was continued with successful results. Cleared areas show little signs of re-infestation but new centres of attack continue to appear.

Cotton.—The usual notification in regard to Cambodia cotton was re-issued during the year. The smoothness or otherwise with which the provisions of this notification are made effective depends very largely on the rains received during the hot weather months. If these are good the temptation to keep the crop standing for a second flush is great whereas if they are poor much of the crop is removed as soon as the pickings obtained from the first flush of flowers is complete. The hot weather rains of 1929 were good with the result that much trouble was experienced in getting the crop removed. In some cases the removal was not complete until early in October, thus defeating entirely the purpose for which the notification is provided.

Groundnuts.—At the request of the residents of Mudhukulam the hairy caterpillar, *Amsacta albistriga, Wlk.*, was declared to be a pest and the necessary notification was issued. In these villages, Mudhukulam, Mullakurichi and Edayakurichi, the hand-picking of moths was carried out efficiently, but in the rest of the notified area was half-hearted. Where the work was done efficiently the crop suffered practically no damage, but the damage done elsewhere was considerable.

Palmyra.—The notification laying down the remedial measures to be taken with reference to the bud-rot of the *palmyra* palm in East and West Gōdāvari, Kistna and Guntūr districts continued in force during the year. The Special Deputy Collector in charge of these operations carried on his work with his usual efficiency with the result that the incidence of the disease was reduced further. As the number of trees attacked was so low and as the procedure to be followed is now so well known the special staff was disbanded and it is now left to the cultivators to look after themselves. The agricultural demonstrators will, however, keep a watch on events and the cultivators will be warned if matters appear to be growing worse again.

VII.—PUBLICATIONS.

47. The undermentioned leaflets and bulletins were published during the year 1929-30 :—

Number.	Subject.	Languages in which published.	Price.
	Leaflets.		RS. A. P.
55	The blue beetle of Paddy *Leptispa pygmae.* A serious pest of the paddy crop in Malabar.	English ... ... Malayalam .. ... Kanarese	Free
56	Green manuring in Gōdāvari, Vizagapatam and Ganjām districts.	English ... ... Telugu ... ... Oriya	Do.
57	A note on varieties of sugarcane in Vizagapatam district.	English ... ... Telugu	Do.
58	The improvement of sugarcane seed.	English ... ... Telugu	Do.
59	The production of fodder and green manure seeds	English ... .. Telugu	Do.

Number.	Subject.	Languages in which published.	Price.
	Leaflets—cont.		RS. A. P.
60	Rations for milch cows, dry cows and calves, etc.	English ... ... Tamil ... Telugu ... ... Malayalam .. ... Kanarese	Free.
61	The preparation in the home of infant and invalid foods from cholam.	Tamil ... .. English ... .. Telugu ... .. Malayalam . ... Kanarese	Do.
62	Home-made malt foods from Great Millet (Andropogon sorghum).	English ... ... Tamil ... Telugu ... ... Malayalam ... .. Kanarese	Do.
63	Conversion of prickly-pear into manure.	English ... ... Tamil . . ... Telugu ... ... Malayalam ... ... Kanarese	Do.
	Bulletins.		Each.
98	Pepper cultivation on the West Coast ...	English ... ... Kanarese ... .. Malayalam	0 2 0 0 2 0 0 2 0
99	Results of experiments at Samalkot on Intermediate season cropping.	English	0 2 0

The Villagers' Calendar for 1929-30 was published as usual in English and the Vernaculars. Ninety-six thousand eight hundred and fifty calendars were printed as shown below for sale and distribution :—

English	8,500
Tamil	38,000
Telugu	39,000
Malayalam	6,350
Kanarese	5,000
	96,850

The year book of the Agricultural Department for 1928 was published during the year.

The monthly digest till September 1929 and quarterly digest thereafter continue to be issued in English and the vernaculars, Tamil, Telugu and Malayalam.

VIII.—STATISTICS.

48. *Forecasts.*—The areas estimated in the crop forecasts in 1928-29, differed from the actuals by 0·03 per cent for sugarcane, 0·07 per cent for paddy, 1·1 per cent for cotton, 2·9 per cent for castor, 3·5 per cent for gingelly and 3·7 per cent for groundnut. The estimates were therefore reasonably accurate.

49. *Rainfall.*—The weekly (calendar) rainfall for each recording station in the Presidency is being compiled, for the purpose of correlating rainfall with system of cropping and outturn with rainfall.

50. *Season and Crop Report.*—This was prepared as usual. The quinquennial table showing the incidence of the land revenue assessment on the area and population in each district of the Presidency was prepared and sent to the Director-General of Commercial Intelligence, Calcutta.

A quinquennial cattle census was taken in the Presidency in July 1930.

51. *Taluk and Village Accounts.*—Inspections of these accounts by the Statistical Assistant were carried out in 10 of the districts of the Presidency and instructions issued on the spot for their better maintenance in the future.

As a result of these inspections it has been possible to suggest the abolition of taluk registers Nos. 24 and 25-A, the revision of taluk register No. 2, and improvements in the village accounts tending towards simplicity which suggestions have been accepted by the Board of Revenue.

52. *Weekly Cotton Mill and Press Returns.*—These returns were published and distributed as usual The number of mills in the Presidency rose from 18 to 22.

IX.—EXPENDITURE.

53. The receipts and expenditure for the year and the corresponding figures for the previous year are as follows :—

	1928-29.	1929-30.
	Rs.	Rs.
Expenditure	18,35,083	19,48,385
Receipts	3,04,775	2,64,224
Net expenditure	15,30,308	16,84,161

The increase in expenditure during the current year over the previous year is mainly due to the general expansion of the Department as sanctioned in G.O. No. 937 (2-S.), Development, dated the 25th May 1929, and to the acquisition of land for the Millet Breeding Station at Coimbatore.

The decrease in receipts during the year is mostly due to the fall in the sale of cotton lint and seeds. The seed farms in Avanashi and surrounding villages were handed over to the Co-operative Department. There was a fall in the sale-proceeds at the Botanic Gardens and other gardens on the Nilgiris. There is also a low receipt under "Miscellaneous" where odd receipts are generally credited.

I have the honour to be,
Sir,
Your most obedient servant,

G. R. HILSON,
Offg. Director of Agriculture.

APPENDIX I

List of officers who have been in charge of different posts in 1929-30.

Serial number.	Name of post.	Name of officer.	Periods of charge. From	Periods of charge. To
		Agricultural College.		
1	Principal	M.R.Ry. C. Tadulinga Mudaliyar Avl.	1-4-29	31-8-29
		M.R.Ry. P. H. Rama Reddi Garu, M.A., B.SC.	1-9-29	31-3-30
		Research Officers.		
2	Agricultural Chemist.	M.R.Ry. Rao Bahadur B. Viswanath Garu, F.I.C., F.C.S.	Throughout.	
3	Research Engineer...	N. G. Charley, Esq., B.E. ...	Do.	
4	Systematic Botanist.	M.R.Ry. C. Tadulinga Mudaliyar Avl.	1-4-29	10-6-29
		M.R.Ry. V. Narayanaswami Avl., M.A.	11-6-29	31-3-30
5	Paddy Specialist ...	R. O. Iliffe, Esq., M.A. ...	11-6-29	31-3-30
6	Cotton Specialist ...	G. R. Hilson, Esq., B.SC. ...	1-4-29	26-8-29
		M.R.Ry. V. Ramanatha Ayyar Avl.	27-8-29	31-3-30
7	Mycologist	M.R.Ry. S. Sundararaman Avl., M.A.	Throughout.	
8	Entomologist ...	M.R.Ry. Rao Sahib Y. Ramachandra Rao Garu, M.A., F.E.S.	Do.	
9	Millet Specialist ...	M.R.Ry. G. N. Rangaswami Ayyangar Avl., B.A.	Do.	
10	Deputy Director of Agriculture, Livestock.	R. W. Littlewood, Esq., N.D.A.	Do.	
11	Curator	F. H. Butcher, Esq. ...	Do.	
		Circle Officers.		
12	Deputy Director of Agriculture, I Circle.	A. C. Edmonds, Esq., B.A.	Do.	
13	Do. II Circle ...	M.R.Ry. B. Ramayya Garu, B.SC.	1-4-29	7-9-29
		Saadat-ul-lah Khan, Esq., M.A. (Oxon), Bar.-at-Law.	8-9-29	14-10-29
		M.R.Ry. D. Balakrishnamurti Garu.	15-10-29	31-3-30
14	Do. III Circle.	M.R.Ry. K. T. Alwa Avl.	Throughout.	

st of officers who have been in charge of different posts in 1929-30—cont.

Serial number.	Name of post.	Name of officer.	Periods of charge. From	Periods of charge. To
		Circle Officers—cont.		
15	Deputy Director of Agriculture, IV Circle.	M.R.Ry. Rao Bahadur D. Ananda Rao Garu, B.SC.	1-4-29	10-11-29
		M.R.Ry C. Narayana Ayyar Avl.	11-11-29	21-12-29
		M.R.Ry. M. Govinda Kidavu Avl.	22-12-29	31-3-30
16	Do. V Circle	M.R Ry. N. S. Kulandaiswami Pillai Avl.	Throughout.	
17	Do. VI Circle ...	R. C. Broadfoot, Esq., N.D.A., C.D.A. (Hons.).	1-4-29	18-9-29
		M.R.Ry. M. Mangesha Rao.	19-9-29	19-10-29
		M.R Ry. B. Ramayya Garu, B.SC.	19-10-29	31-3-30
18	Do. VII Circle ...	M.R Ry. M. Govinda Kidavu Avl.	1-4-29	21-10-29
		Saadat-ul-lah Khan, Esq., M.A. (Oxon), Bar-at-Law.	22-10-29	31-3-30
19	Do. VIII Circle.	D. G. Munro, Esq., B.SC.	1-4-29	23-9-29
		R. C. Broadfoot, Esq., N.D.A., C.D.A. (Hons).	24-9-29	31-3-30

DIVISION INTO AGRICULTURAL CHARGES

I Ganjam, Vizagapatam, East Godavari and West Godavari
II Kistna, Guntur and Nellore
III Kurnool, Bellary, Anantapur and Cuddapah
IV Chittoor, North Arcot, Chingleput and South Arcot
V Tanjore and Trichinopoly
VI Madura, Ramnad and Tinnevelly
VII Malabar and South Kanara
VIII Salem, Coimbatore and the Nilgiris

MAP OF THE MADRAS PRESIDENCY

Scale of Miles 50 100 Miles

Showing

1 The division into Agricultural charges
2 the location of the Agricultural stations &
3 the distribution of the main crops in each Agricultural charge.

NOTE:—(1) The charge of each Deputy Director of Agriculture is indicated by Roman figures.

(2) The separation of one Agricultural charge from another or from an Indian State is shown thus. ——————

(3) The total cultivated area in each Deputy Director's charge is represented by a circle drawn to scale. The figure entered against each crop in the circle represents the percentage of the area under it to the total cultivated area.

(4) The head quarters of Deputy Directors in charge of each circle are represented. ●

(5) Agricultural Research stations ●

(6) Agricultural Middle Schools ■

(7) The head quarters of Agricultural Demonstrators ●

(8) The head quarters of District Agricultural officers. ■

(9) Live Stock Research stations ○

BAY OF BENGAL
ARABIAN SEA
CEYLON
DOMINIONS OF H.E.H. THE NIZAM'S
BOMBAY PRESIDENCY
MYSORE
COORG
TRAVANCORE
COCHIN
CENTRAL PROVINCES
BIHAR & ORISSA
ST. THOMAS'S MOUNT

Reg. No. 898
Copies. 950
Helio-Zinco., Survey Office, Madras.
1930

Government of Madras.

DEVELOPMENT DEPARTMENT

G.O. No. 1756, dated 17th September 1930

Agriculture—Administration Report—1929-30—Recorded with remarks.

READ—the following paper :—

Letter from G. R. HILSON, Esq., B.SC., Officiating Director of Agriculture, Madras, to the Secretary to Government, Development Department, dated Madras, the 15th August 1930, R.O.C. No. D. 68-Pdl.

Order—No. 1756, Development, dated 17th September 1930.

Recorded.—

2. During the year under review the constitution of the Provincial Service has been so altered as to make it ultimately replace the existing Indian Agricultural Service as recommended by the Royal Commission on Superior Services. In accordance with the policy approved by Government in the reorganization scheme accepted in G.O. No. 937 (2-S), dated 25th May 1929, the following new posts were sanctioned during the year:—

A Headquarters Deputy Director.
An Oil Seed Specialist.
Five posts in the Madras Agricultural Service.
A Personal Assistant to the Principal of the Agricultural College, Coimbatore.
Eight Demonstrators.

Of these the first two, though temporary ones, are likely to be made permanent.

The demand for collegiate education continued to be on the increase during the year under review. Middle school education, however, was not attended with much success and the results of the Taliparamba School show that this type of education has not made much appeal to the cultivator. Before taking a final step about the continuance or otherwise of this school Government wish to watch its working for a few years more and review the situation again. Government hope that the school opened at Usilampatti during the current year for the Kallars by the District Board, Madura, with the aid of a half-grant from Government and loan of services of staff by the Agricultural Department will be productive of good results. Meanwhile the Director of Agriculture is requested to do all he can to see if this medium of education in agriculture cannot be popularized.

Research work on crops followed the usual main lines of plant breeding and agronomy. No new lines were embarked upon in the paddy breeding stations where the possibilities of hybridization and selection are being further investigated. On account of the definite drop in the price of rice, with no hope of a rise in the price in the near future, the Government agree with the Director that work on this crop should be directed towards discovering means of reducing the cost of production and of altering the system of cultivation to permit of other more profitable crops being grown in rotation with it. Work on cotton continued on the normal lines and Government note with satisfaction that the Kovilpatti and Guntūr Research Stations show promise of producing a new strain of karunganni higher in quality and yield than the present variety, and that experiments on early sowing, referred to in the last two administration reports, have definitely established that early sowing gives a heavier yield. The tendency for ryots in the Tinnevelly area to grow pulichai, which is of an inferior spinning value, with karunganni to pass the mixture as karunganni is reported to be on the increase. This is a serious menace to the popularity of the Tinnevelly cotton. As the ryots are not amenable to persuasion and advice the Director considers that more drastic

action is required. The question is separately under the consideration of Government and if no other remedial measures are forthcoming the Government will consider the advisability of undertaking legislation to prevent this abuse.

Experiments on sugarcane, coconuts, potatoes, dry grains and fodder crops proceeded on the normal lines and steady progress is reported.

A pleasing feature of the work on fodder crops is the beneficial effect which a dressing of ammonium sulphate and supers has on cholam and if future results confirm this the possibility of solving the fodder problem will not be hopeless.

Good progress is reported in the Botanical, Chemical, Mycological and Entomological sections. The coffee beetle stephanoderes was found in some imported beans and necessary action to prevent further import of this dangerous pest has been taken in conjunction with the Government of India who have issued a notification prohibiting the import of unroasted coffee beans by sea or land into this Presidency. Coming to the mycological section it is satisfactory to note that three departmentally evolved strains of paddy and sugarcane have been found to be resistant to the paddy blast and mosaic diseases of sugarcane respectively.

Work on the four cattle stations continued on the lines of previous years though progress is necessarily slow. Work on sheep and poultry also is conducted at Hosūr and the latter, it is hoped, will receive considerable impetus when the Upper Subordinate who has been deputed to Lucknow for training in poultry returns.

Demonstration was carried on as usual on the land of ryots and by taking part in exhibitions, fairs and conferences. The two exhibition vans of the department continued to be popular in villages. Demonstrations of improved seeds, improved methods of cultivation, manures and implements were conducted.

The Cotton Ginning and Pressing Factories Act, the Cotton Transport Act and the Agricultural Pests and Diseases Act continued to work satisfactorily during the year under review and substantial progress is

reported in the Agricultural Engineering section which is under Mr. Charley.

The Director should have indicated the programme of work for the next year in the administration report.

(By order of the Government, Ministry of Development)

S. V. RAMAMURTI,
Secretary to Government.

To the Director of Agriculture.
" Director of Veterinary Services.
" Registrar of Co-operative Societies.
" Law (Education) Department.
" Public Works and Labour Department.
" Public Department.
" Accountant-General.
" Director of the Research Institute, Pusa.
" Government of India, Department of Education, Health and Lands (with C.L.).
" Secretary, Imperial Council of Agricultural Research.

Press.

தமிழ்நாடு ஆவணக்காப்பக நூலகம்,
எழும்பூர், சென்னை-600 008.

அவணைந்தாள்.

சே எண் : ப. எண் :

வழங்கிய நாள். (1)	திரும்பிய நாள். (2)	வழங்கிய நாள். (1)	திரும்பிய நாள். (2)
1/2/84			

S.F. 259A-6—1,00,000—30-1-84.