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**Report on the Operations of the
Department of Agriculture,
Madras Presidency
for the Year
1935-36**

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OFFICE OF THE DIRECTOR OF AGRICULTURE,
Madras, dated the 10th August 1936.

From

M.R.RY. RAO BAHADUR D. ANANDA RAO GARU, B.Sc.
Director of Agriculture,
Madras.

To

THE SECRETARY TO GOVERNMENT,
DEVELOPMENT DEPARTMENT,
Fort St. George, Madras.

SIR,

[Administration report—Agricultural department 1935-36]

I have the honour to submit the report on the operations of the Department of Agriculture for the year 1935-36.

I.—ADMINISTRATION.

2. S. V. Ramamurti, Esq., I.C.S., continued to be in charge of the department till 19th June 1935. On his transfer to the regular line I was appointed as officiating Director of Agriculture on 20th June 1935 and I continued to be in charge of the department from that date. I was subsequently confirmed as Director of Agriculture with retrospective effect.

3. *Indian Agricultural Service*.—Mr. R. C. Broadfoot who continued to be the Headquarters Deputy Director of Agriculture till 21st June 1935, was transferred to Coimbatore as officiating Principal, Agricultural College, and he held that post from 22nd June 1935. He was subsequently confirmed as Principal with effect from 28th June 1935, and from that date Mr. R. W. Littlewood, Deputy Director of Agriculture, Livestock, was promoted to the selection grade.

Mr. D. G. Munro, on return from leave on 23rd September 1935, resumed charge of the duties of the Deputy Director of Agriculture, VIII Circle, Coimbatore, and Mr. Littlewood, on return from leave resumed charge of the post of the Deputy Director of Agriculture, Livestock, on the 11th September 1935.

Mr. Saadat-ul-lah Khan, who was on long leave from the date of his reversion to this department, joined duty as Deputy Director of Agriculture on 16th August 1935 at Madura.

Mr. A. C. Edmonds, Deputy Director of Agriculture, III Circle, Bellary, has been on leave out of India from 3rd January 1936 and in the consequential arrangements Mr. Saadat-ul-lah Khan was transferred from VI Circle to IV Circle.

4. *Madras Agricultural Service*.—M.R.Ry. C. Narayana Ayyar Avargal was transferred from IV Circle to Madras as Headquarters Deputy Director of Agriculture from 25th June 1936.

The post of Deputy Director of Agriculture in the Indian Agricultural Service vacated by Mr. Broadfoot on his appointment as *Principal* was abolished with effect from 28th June 1935 and M.R.Ry. K. Gopalakrishna Raju Garu was appointed to it without prejudice to his appointment as Provincial Marketing Officer.

M.R.Ry. M. C. Cheriyan Avargal, Lecturer in Entomology, was promoted to the post of Government Entomologist on probation from 20th July 1935.

M.R.Ry. K. C. Naik Avargal, who was selected for the post of Superintendent, Fruit Research Station, Anantarajupet, assumed charge on 3rd August 1935.

5. In connexion with the Madras Herbaceum Scheme financed by the Indian Central Cotton Committee, a gazetted post of assistant was sanctioned in lieu of a post in the subordinate service and Mr. R. Balasubrahmanyam, Assistant in Cotton, was appointed to it.

For investigation into the chemistry of malting cholam financed by the Imperial Council of Agricultural Research, a gazetted post was sanctioned by Government for a period of three years to which M.R.Ry. M. Suryanarayana, Assistant in Chemistry, was appointed.

Another temporary gazetted post of Parasitologist was sanctioned for employment in the Madras Pempheres and Physiological Scheme financed by the Indian Central Cotton Committee, which has been filled by M.R.Ry. P. N. Krishna Ayyar Avargal, Assistant Lecturer in Entomology.

The continuance of the temporary posts of Superintendent, Rice Research Station, Berhampur, and Superintendent, Dry Farming Scheme, Hagari, was sanctioned during the year.

M.R.Ry. Rao Bahadur B. Viswanath Garu, whose services were placed at the disposal of the Central Government, was confirmed as Imperial Agricultural Chemist.

Mr. K. S. Viswanatha Ayyar, Assistant Agricultural Chemist, Dr. T. V. Ramakrishna Ayyar, Government Entomologist, and Mr. T. Lakshmana Rao, Assistant Agricultural Chemist, retired from service during the year.

Mr. F. H. Butcher, Curator, Government Botanic Gardens, Ootacamund, was granted leave from 20th February 1936 preparatory to retirement on 29th May 1936.

6. *Madras Agricultural Subordinate Service*.—The upper subordinate cadre was increased by 29 posts during the year. Of these, 4 were intended for promotion of 4 deserving lower subordinates and the remaining 25 were for district work in the I to IV Circles.

Besides the above, four posts of upper subordinates were sanctioned temporarily for a period of five years for extension of work on animal nutrition at Coimbatore, financed by the Imperial Council of Agricultural Research.

II.—AGRICULTURAL EDUCATION.

7. There was no change in the activities of the department during the year in regard to agricultural education.

8. *Agricultural College, Coimbatore*.—There was a slight improvement in the number of applications to the college. One hundred and sixteen applications were received as against 91 in the previous year and 139 the year before last. Of these, 96 appeared for interview before the Selection Committee, from whom 44 were selected and 17 were placed on the waiting list. Only 35 joined the college on the reopening day and nine were admitted later from the waiting list. Two failed students were readmitted. Two students resigned subsequently. The final strength of Class I was 44.

Scholarships.—Of the five scholarships, three were given to Muhammadans and two to backward classes. The scholarship that was kept in abeyance last year was awarded as a merit scholarship to a student of Class II. One of the scholarship holders of last year failed to get promotion and forfeited the scholarship. This was given to a deserving student of Class III.

Examinations.—The number of candidates that appeared for the B.Sc. (Ag.) examinations and passed is as follows:—

		Number appeared.	Number passed.
First examination		30	26
Second examination		41	26 *
Final examination		26	23

Old regulations—

Part II		8	8
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* Plus 11 who failed in one subject only.

Tours.—The senior students of the college were taken on tour during October 1935 to Hagari, Mysore, Bangalore and Salem and students of Class II to Northern Circars in January 1936.

9. *Agricultural Middle Schools*.—The school at Usilampatti continued to be under the management of the District Board, Madura. There were 30 students during the year at the school. An industrial school was started in July 1935 by the Ramnad District Board at Muthanandal with 27 boys. The course extends

to over two years and education is imparted in agriculture and subsidiary industries like weaving, raising of poultry, bee-keeping and rural reconstruction.

Agriculture was introduced during the year as an optional subject in the Secondary School-Leaving Certificate curriculum in the Board High Schools at Koilpatti, Tenkasi and Rajapalayam.

10. *Farm Labourers' Schools*.—The three schools at Anakapalle, Palur and Coimbatore continued to function. At Anakapalle there were 24 boys on the rolls during the year as against 26 in the previous year. There were 17 adults in the night school. At Palur, there were 28 on the rolls including one girl as against 30 last year. In the night school, the average number on the rolls was 15. At Coimbatore, there were five boys in the school with wages and 14 without wages as against 5 and 16 respectively during the last year. The night school at Coimbatore was closed under orders of Government.

11. *Short courses in Practical Agriculture*.—The following courses were conducted during the year at the Agricultural College, Coimbatore.

Course.	Time.	Period.	Number of students attended.
1 Farm Management ..	June to March ..	9 months.	12
2 Malt-making ..	October ..	15 days ..	16
3 Insect pests and diseases.	November ..	15 days ..	18
4 Jaggery-making ..	February ..	25 days ..	26
5 Bee-keeping ..	February ..	25 days ..	25

Students attending the "Farm Management" course were permitted to attend other courses also.

12. *A course of study in Co-operation*.—The course started in 1934 was continued during the first two terms of the year when 35 and 17 students took the course in the first and second terms respectively. As no students attended during the third term, the classes had to be closed.

13. *Dairy*.—At the beginning of the year, there were on an average 29.2 cows in the herd of which 21.1 were in milk and 8.1 dry as against 32.3, 22.3 and 10.0 respectively in the previous year. The percentage of cows in milk to the total number in the herd was 71.9 as against 69.3 in the year previous.

The total yield of milk was 119,245 lb. as against 116,506 lb. in the previous year. Eighty-six thousand eight hundred and ninety-four pounds were sold, 12,684 lb. fed to calves, 11 lb. used for demonstration purposes and 1,809 lb. were colostrum.

Seventeen thousand eight hundred and thirty-eight pounds of milk were separated as against 19,445 lb. of the previous year from which 1,781 lb. of cream were obtained. Fifty-two pounds

of cream were purchased in connexion with the University examinations. Of the total quantity of 1,833 lb., 1,776 lb. were converted into butter, the quantity of butter obtained being 989 lb. As only 661 lb. could be sold as butter 283 lb. were converted into ghee; whereas out of the 1,102 lb. of butter produced in the previous year, 718 lb. were sold and 354 lb. converted into ghee.

The receipts from the dairy during the year amounted to Rs. 11,603 and the expenditure to Rs. 12,856 as against Rs. 12,255 and Rs. 18,132 respectively in the previous year. The financial working of the dairy discloses a net loss of Rs. 1,253 as against Rs. 5,900 in the previous year. The reduction in the loss is due mainly to the exclusion from the financial statement of the salary of the dairy manager and a few menials who are intended for instructional purposes.

14. *Conference*.—The Twenty-fourth College Day and Conference was held during August 1935 under the presidentship of the Hon'ble Mr. (now Sir) C. A. Souter, c.s.i., I.C.S., Revenue Member. Several papers were read and discussed at the Conference, as usual.

III.—SEASON.

15. The south-west monsoon started late as in the previous year. At the end of the first week of June there was an advance of the monsoon in the south-east Arabian Sea. It established itself in Malabar on the 12th June and the rainfall was heavy along the West Coast in the second fortnight of the month, with local thunderstorms in the Deccan. The rainfall during this month was either normal or above normal in all districts except the Circars, Chingleput, the West Coast and the Nilgiris. In the third week of July, the monsoon was strong in the north Madras Coast and parts of the Deccan as a result of depression which formed off the Ganjam Coast on the 15th. The rainfall in July was heavy on the West Coast and above normal in the Circars (Kistna and Guntur excepted), the Deccan (Anantapur excepted) and Nellore. Good rains were received in August in almost all the districts and the rainfall in the month was above normal outside the Circars and the West Coast. The monsoon weakened in the latter half of September. The south-west monsoon was on the whole bordering or above normal in East Godavari, West Godavari, Kistna, the Deccan, Nellore, Chingleput, the Central districts (Coimbatore excepted), Madura and South Kanara and below normal in the other districts.

The north-east monsoon became established over the south Bay of Bengal on the 11th-12th October 1935. The depression formed in the south-west Bay of Bengal off the Coromandel Coast on the 17th October rapidly intensified into a storm and crossed the coast near Madras on the next day. This disturbance caused widespread rain generally during the succeeding week,

the rainfall being locally heavy in the north Madras Coast, south-east Madras and Malabar. The rainfall during the month was above the average in West Godavari, the Deccan, the Carnatic, Chittoor, North Arcot, Tinnevely and the West Coast and below the average elsewhere. On the 14th November, a storm moving westwards from the Bay of Bengal crossed the coast near Negapatam and travelling thereafter as a deep depression across South Madras, it passed out by the 16th morning into the south-east Arabian sea off Malabar. This disturbance was responsible for widespread rain in the south of the peninsula with locally heavy falls in south-east Madras. Heavy rains associated with the storm caused severe floods in the rivers of South Malabar and damaged bridges and houses. Negapatam faced considerable damage. The rainfall during the month was above the average only in Trichinopoly, Tanjore and Madura. The monsoon was generally weak in December, but the rainfall in the above three districts and in the districts of South Arcot, Salem and Coimbatore was above the average. There was practically no rainfall in January 1936. The north-east monsoon was on the whole above the average only in South and North Arcot, Trichinopoly, Tanjore, Madura and South Kanara districts.

The effect of the season on the crops at the various Agricultural Research stations.—Although the rainfall was insufficient at Berhampur, the season was good for all crops. The adverse seasonal conditions from start to finish at Anakapalle affected the yields of sugarcane, paddy and millets. Paddy and sugarcane at Samalkota, however, fared well. The uneven distribution of rain in Maruteru affected paddy on the station. Heavy rains in September spoiled tobacco nurseries and interfered with the groundnut harvest at Guntur. The season was quite favourable at Hagari and very good yields of cotton, groundnut and Italian millet were obtained; while at Nandyal fodder jonna suffered from drought in its early stages and later from excess of moisture. The season was generally beneficial to all crops at Palur and Gudiyattam, while deficient and bad distribution of rain at Tindivanam interfered with the good setting of groundnut pods. At Aduturai, the heavy rains in December interfered with the proper settings of the grains and were responsible for the widespread attack of *Piricularia Oryzae* or "blast" on paddy. A thunderstorm in June accompanied by heavy rain did considerable damage to crops and property on the station. Pattukkottai fared no better; paddy was affected by the scanty south-west monsoon rains and the storm in November did serious damage to crops and buildings. Millets and pulses came up well at Koilpatti but the season was unfavourable to cotton. The good distribution of the south-west monsoon rains at Taliparamba was beneficial to wet and dry crops but the low rainfall in the north-east monsoon season affected the dry land crops. The season was quite favourable to Hosur where there was plenty of grazing and good hay harvest. The season was very disappointing at Coimbatore; in

the Central farm, all crops were adversely affected while on the Cotton Breeding station cholam withered prematurely and cotton and Bengalgram had a serious set-back. Paddy in the paddy Breeding station and dry crops in the Millet Breeding station, were badly affected.

IV.—RESEARCH.

A.—Botany.

16. The work of the section is divided into systematic and economic. The former related to the identification of 765 botanical specimens and to the addition to the Herbarium of 755 specimens received mostly from Kew. The section also loaned some specimens to the Forest Botanist, Dehra Dun. In regard to the latter, the survey of plantains of the Presidency continued in the Nilgiris, Bellary and Coimbatore districts. Two new varieties, one from Bellary and another from Kallar were added. Experiments in preparing 'figs' from Bananas were done in eight varieties and it was found that the juicy varieties gave the best quality figs.

The study of fodder grasses was continued. *Panicum maximum* and *Chloris Bournei* gave the best yields.

B.—Chemistry.

17. The soil survey of the Tungabhadra project started last year consisted of the examination of soil by means of profile pits at the rate of one pit for every four square miles. During the year the samples were analysed at Coimbatore for their physical characters and water relations. It was observed that in the area black soils occupy about 58 per cent, shallow blacks 22 per cent, red and mixed soils the remaining area. The black soils possessed generally a high water-holding capacity, a high base exchange, a p.H. ranging from 8.5 to 9.5 and a low permeability, while the red soils were shallow light in texture and had a low salt content. It was observed in the survey that soils already under irrigation since ancient days did not deteriorate or develop alkalinity. A soil survey was also made of the Willingdon reservoir with a view to find out the cause of alkalinity which has developed in that area. It was found that the soil did not contain a high content of injurious salts and the alkalinity was probably the result of insufficient drainage.

Investigations in soil science related to soil moisture at Hagari, study of physical and chemical properties of soil and soil colloids. The experiments on molasses as a fertilizer for paddy reported last year gave no encouraging results. The experiment on the use of affluent from the activated sludge plant had to be abandoned on account of unfavourable weather conditions.

Animal nutrition experiments were continued on working bullocks with a ration of cotton seed and *irungu* cholam straw. The results confirmed the previous findings, namely, that a bullock

requires 100 grammes of digestible proteins per 1,000 lb. live weight for maintenance purposes. It was also observed that *irungu* straw had the same digestibility as that of *chitrai* or *periamanjai* cholam straw.

In the investigation of mineral metabolism of dairy stock, it was observed that while lime and phosphoric acid in the diet of calves were more than sufficient for their bone formation, the dairy ration including the mineral mixture in the case of cows in milk was sufficient in phosphates but not in lime which indicates that the ration needs to be slightly altered. Work done in different kinds of ragi in regard to their biological values of proteins showed that when fed to rats, the unit gain in their weight was greater when fed with white ragi than with brown ragi.

Bacteriological investigations proceeded on similar lines to previous years; for optimum sulphur oxidation an adequate quantity of nitrogen in the form of ammonium sulphate or urea, and carbon in the form of bicarbonate were necessary. Studies in *Azotobacter* and bio-antagonism were in progress. Nodule cultures of soya bean, groundnut and clover were prepared and supplied to various research stations requiring them.

The attention of the section continued to be directed to certain industrial problems. Modifications in the manufacture of active carbon were made with a view to increase its efficiency and reduce its cost. A large quantity of carbon was supplied to several district officers for cream jaggery demonstrations. Groundnut hulls, cotton stalks, husks of coffee and coconut, saw dust, spent avaram bark which are waste products were experimented with for the manufacture of activated carbon; results with groundnut hulls are most promising. That active carbon could be used fairly successfully for clarifying coconut palm juice and various edible oils has been demonstrated. The physico-chemical studies on jaggery revealed that the proportion of non-sugar organic matter present in the juice had a profound influence on the quality of jaggery. With a grant from the Imperial Council of Agricultural Research work on cholam malt was started during the year.

C.—Crops.

(1) Cereals.

18. (a) *Millet*s—(i) *Sorghum*.—At the Millets station, about 1,460 units of sorghum were handled for economic and scientific studies. A.S. 1575, the standard strain in the summer white variety while being shorter in duration by 10 days was the best in yield. Another strain—A.S. 732—was found to be significantly superior to the Central farm bulk seed. In the summer yellow variety A.S. 809 continued to be the best being significantly superior to the Central farm bulk seed. The adverse season for the second time told heavily on the main season crop and comparative trials have to be repeated next year. Certain American

varieties suitable for malt making and grown by the Millets section were tried by the chemist who has found six of them promising. *Irungu* sorghum sent to Rhodesia has been found to be a good trap crop for *striga*.

In Guntur, over 500 units were under study, 5 of which proved superior to local. It was found that the top grain in a sorghum ear-head when used for seed, yielded better than bulk seed. Root studies in the dry farming research station at Hagari showed that varieties with compact ear-heads have greater lateral root spread than the loose panicle varieties which seem to possess a deeper root system, and that mature earless sorghum plants have a poor root system. At Koilpatti, selection No. 171 for fodder yielded 20 per cent over the local.

(ii) *Ragi* (*Eleusine coracana*).—During the year over 800 units of ragi were grown in two seasons at the Millets station. Four series of comparative trials were laid out in randomized blocks. E.C. 593 continues to be the best strain; 5,600 lb. of seed of this strain were distributed in the districts. In the Chingleput and South Arcot districts another strain E.C. 1507, short duration in nature, was issued. The time of sowing experiment conducted during 1930 and 1932 revealed that the sowing time in the main season for E.C. 1000, a strain $3\frac{1}{2}$ months in duration, is June and that there is nothing to choose between the months of January to April. For E.C. 24 which is, however, a strain which takes a month longer to mature, it was found that June and July are equally good months for sowing in the main season and that it may be sown from January to April as a summer crop.

At Hagari, fortnightly plantings of E.C. 593, T. 8 and two short duration types of Anakapalle—Nos. 355 and 525—showed that Anakapalle strains do well only if planted by the 15th May, and that E.C. 593 is the heaviest yielder if planted after the 15th July. E.C. 593 at Koilpatti gave a 55 per cent increased yield over the local, but its open panicle is not in favour with the ryots. Another strain, E.C. 24, with an incurved panicle also obtained from the Millets Specialist was tried which yielded 45 per cent more than the local ragi.

At Anakapalle, 34 selections are under study of which No. 525 has given an increased yield of 24.7 per cent over the local. It seems to be suitable for the southern taluks of the Vizagapatam district.

(iii) *Korra* (*Setaria Italica*).—Four hundred units of this millet were under study at the Millets station. At Hagari, the root system of the mature *setaria* plants was studied which indicated that profusely tillered plants with non-plaited ears have a deep root system going down to two feet while the sparsely tillered plants having plaited ears have greater lateral spread but confined to the top 6 inches only.

(b) *Paddy*.—The 3 lines along which work in the paddy section is being developed are selection, hybridization and introduction. In regard to the first, 165 strains from six varieties of Tinnevely, Madura and Chingleput districts were under trial, 25 of which have been taken to further trials as being the most promising. Two strains of *sendhinayagam*, a variety from Tinnevely are reported to have done better than the local variety tried in the tract. The hybrid strains bred for *piricularia* resistance have done very much better than the susceptible variety *Korangu samba* the season having been particularly favourable for the spread of the disease. It is proposed to release for distribution a strain suitable for resistance to *piricularia*. Strain No. 10905, a cross progeny from Co. 3 which is better than Co. 3 both in yield of grain and strength of straw is available for being released. This is the first hybrid strain produced on the paddy station. Several Patna rices imported into the Presidency have proved better than G.E.B. 24 in parts of the VIII circle. In the I circle, *pichodi*, an introduction from Hyderabad is becoming increasingly popular.

At Maruteru, ten strains of the first crop varieties were under trial at several centres in Kistna and Guntur districts. Two strains, one of *atragada* and another of *konamani* have done well in the districts.

At Pattambi, four strains from important varieties are being released this year having shown a consistent increase in yield varying from 10 to 16 per cent over the ryots' seed. Seven hundred and seventy-nine single plant selections isolated from five varieties, four of South Kanara and one of Malabar, were under observation.

Eighty-two strains from five of the most important varieties were under yield trials at Berhampur for the second time a large number of which have given increased yields varying from 15 to 20 per cent over the control. Work on hybridization will also be continued in the station.

At Samalkota, 1,355 selections from half-a-dozen varieties were made. *Konamani* 87 tried for the second time in the districts in four centres yielded 7.2 per cent more than the local.

At Palur, selection work was in progress in five important local varieties. Strain 43, a selection from *Garudan samba* yielded 8 to 10 per cent over the local in many of the trial plots conducted in the circle.

At Aduturai, strain No. 6119 a mutant strain from Adt. 4 gave 29.7 per cent increased yield over Adt. 4 which in itself gave 10 per cent increase over the bulk. It is proposed to introduce this strain in the district under trial plots in the coming season.

19. *Agronomy*—(i) *Cultural experiments*.—At the Paddy Breeding station, Coimbatore, experiments have shown that the practice of dibbling the seed in lines in puddle is just as good as transplanting. Attempts are being made with the assistance of the Agricultural Research Engineer to devise a simple drilling machine suitable for puddled fields.

At Berhampur, broadcasting has again proved to be as good as transplanting, optimum seed rate being 40 to 60 lb. per acre.

At Maruteru, the advantage of planting seedlings closer in lines but having them wider apart between lines has been once again demonstrated. The optimum spacing at Pattambi and Berhampur is said to be within 6 inches.

At Pattambi, no differences were noticeable in regard to seedlings varying in ages from 30 to 60 days so long as planting was done in the normal season but if planted out of season the age of seedlings should be less than 50 days.

At Berhampur, the optimum age seems to lie between 30 to 40 days, while at Maruteru the advantage of planting early seedlings of 20 to 30 days seems to be bound up with thin sowing of the nursery and manuring of seed-beds. To older seedlings of 40 to 50 days manuring of seed-bed seems to be of no advantage.

At Samalkota the addition of sand to paddy land with a view to improve the physical texture had a depressing effect on the yield for the first three years but later it had a beneficial effect.

(ii) *Manurial trials*.—Manurial experiments at Berhampur and Pattambi with different ratios of nitrogen and phosphoric acid, different forms of phosphatic manures, different quantities of green leaf with and without the addition of chemical fertilizers revealed that phosphatic manures applied in whatever form had no response, that at Pattambi green manures are better than mineral fertilizers applied to supply the same amount of nitrogen, that at Berhampur applications of nitrogenous fertilizers over a dressing of green leaves give definite increases in yield, that increasing doses of green leaf gave increased yields and that residual effects were noticeable in plots receiving heavy application of green leaf. The rice soils at Pattambi responded slightly to the application of lime.

The subsidized manurial trials at Maruteru on the second crop indicated that the application of 32 lb. each of nitrogen and phosphoric acid per acre as ammophos or a mixture of ammonium sulphate and super phosphate is a beneficial economic dose, that both milled guano and flower phosphate as suppliers of phosphoric acid had a similar effect, that phosphoric acid by itself gives no response and that in organic and inorganic manures no residual effects were noticeable in the yield of the succeeding main crop.

The application of 30 lb. of nitrogen as ammonium sulphate or sodium nitrate singly or in combination in different proportions showed that ammonical nitrogen is better than nitrate nitrogen and that a portion up to half of the former can be replaced by the latter without affecting the yield.

At Samalkota, manuring paddy land with 6,000 lb. of green leaf and 1½ cwt. of super per acre gave the best results.

Economics of rice growing.—In these days when it is stated on all hands that alternative crops should be substituted for paddy as it is no longer paying, it is desirable to see how far such a statement is correct. Adopting all the improvements recommended by the department the net profits per acre excluding land assessment and water-rates at the three agricultural stations are as follows:—

	RS.
Coimbatore (single crop)	77
Maruteru (two crops)	77
Pattambi (two crops)	88

(2) Fibres (Cotton).

20. (i) *Breeding.*—Out of eight district trials carried out on three strains of Cambodia cotton, in five cases it was shown that two of them, namely, 920 and 1,267 were better than Co. 2. They were grown under ryots' conditions for seed multiplication and are reported on favourably. Some of the crosses made between Co. 2 and South African cotton cultivated on a plot scale indicated that four of them are earlier than Co. 2 by one month yet yielding similarly. These results give promise of obtaining a cotton which would enable ryots to adopt the necessary close period between successive crops of cotton suggested by the department.

At Koilpatti, the main season picking showed that KPT. 1 gave the highest yield at 235 lb. per acre followed by A. 10 with 204 lb. This year's summer pickings were reported to be better than those of last year.

At Guntur, four strains of Cambodia cotton grown under dry conditions are under comparative study. At Hagari, *inter se* crosses between H.I. and 1162 and H.I. and Surat 1027 A.L.F. were effected with a view to evolve a better strain than H.I.

Comparative trials made at Nandyal to obtain better strains than N. 14 indicated that 'Gadag' both in yield and ginning percentage was better than N. 14.

Varietal trials on 'Poonam' land in Malabar indicated that *Karunganni* 546 would be a very suitable substitute for the coarse short stapled cottons of the tract.

(ii) *Agronomy.*—The effect of a mixture crop of sorghum and pulse on the succeeding cotton was found to be the best in the proportion of three parts of the cereal to one of pulse. Of the pulses tried cluster beans and greengram withstood better the interference of the cereal than others. It was also noticed that the growing of certain legumes in association with sorghum was not beneficial to the succeeding cotton.

An irrigation experiment laid down to determine the best time for the application of water to Cambodia cotton revealed that good crops could be obtained with only two irrigations applied after the closure of the north-east monsoon and the best period

for irrigation would be the second week in December and January. It was also noticed in the cotton station that the effect of one irrigation in these months lasted up to four weeks. Inter-cultivation experiments with bullock hoes indicated that frequent cultivations tended sometimes to lower the yields.

(iii) *Schemes financed by the Indian Central Cotton Committee*—(a) *Madras Herbaceum Scheme.*—This is the sixth year of the existence of the scheme on hybridization. The new strain was tried in three places in the district. In spite of the long drought and untimely rains it proved better than *Karunganni* and *Uppam* in two places and the spinning test at the Technological Laboratory at Bombay showed that it is capable of spinning as high as *Karunganni*. Since its narrow leaf is a disadvantage inasmuch as it is likely to be mistaken for the short stapled roseum cotton, attempts are being made to select seed from the broad lobed mutants found in this type. Six strains are under comparative trials for yield three of which are promising.

(b) *Madras Pempheris and Physiological Scheme.*—This scheme has run for five years. This year's investigations show that greater mortality of plants is found in the indigenous cottons than in the Americans. The affected plants seem to resist the attack by the formation of galls covering the injury and by the production of a gum checking the progress of the insect. The study also revealed that the gum was pathological in origin and that there is a fairly close association between the extent of water soluble polysaccharide contents in the stem and the readiness of the plant to produce gum to check the progress of the grub.

The Parasitologist employed under the scheme made a survey of all important cotton tracts and found that *Pempheris* prevails as a pest of cotton in Ramnad, Coimbatore and Tinnevely districts and also as a pest of a vegetable—*Bendai*—in the Malabar district, and that parasitization on the weevil is only to the extent of about 4.7 per cent. One of the parasites is found in large numbers and is capable of destroying the weevil by stinging. Attempts are being made to multiply this parasite in large numbers with a view to liberate them next season.

Work at Koilpatti on the bud and boll shedding of cotton was continued with a view to obtain selections which would shed least during the rains in February. A study made in it showed that a few selections not only shed their bolls in small quantities but yielded more taking advantage of the rains in February.

(c) *The Madras Fodder Chulam Scheme.*—This scheme also has been running for five years. Due to the failure of the monsoon many of the trials gave inconclusive results. Experiments on spacing, manuring and growing chulam mixed with pulses and other experiments like thick sowing, late sowing, etc., were continued. The studies on base exchange in soil confirmed the inference that sodium ions increased in quantity as a result of growing chulam.

(d) *The Madras Nadam Breeding Scheme*.—This is the third year of the scheme. As in former years, this scheme was worked at Perundurai in a land taken on lease. July sowings were given up to give a close period between the two crops. In many of the exotic cultures it was found that the pickings were completed before the end of March which gave an indication that it would be possible to raise a cotton crop with the rains of the north-east monsoon. This inference was confirmed by some of the results obtained from growing exotic cottons on a plot scale. An average yield of 232 lb. of kapas per acre which has been obtained may be considered as satisfactory when compared to those got in Nadam cumbu mixture. A spacing experiment in a rain-fed Co. 2 crop indicated that a spacing of $1\frac{1}{2}$ feet between rows and 9 inches in the row would be the optimum spacing for light porous soils.

(3) Fodders.

21. As in previous years different fodder crops were cultivated in different agricultural stations in the Presidency. At the Central Farm, Coimbatore, elephant grass yielded very heavily at nearly 167,850 lb. green per acre. The average acre yields of *Periamanjai cholam*, maize and guinea grass were 18,600, 16,360 and 48,000 lb., respectively. At Palur, where 4 acres were put under fodder, Teosinte and fodder *cholam* yielded at 34,840 and 24,600 lb. green per acre, respectively. Reference has already been made elsewhere to the experiments carried on by the systematic Assistant at Coimbatore on different varieties of common fodder grasses.

(4) Fruit.

22. The inauguration of a Fruit station at Anantarajupet, near Kodur, in Cuddapah district aided by funds financed by the Imperial Council of Agricultural Research was an important step taken during the year as this is the first fruit station for the plains in the Presidency. Though the site was acquired in March 1935 the Superintendent joined duties only early in August. A survey of a few of the orchards of the Presidency including Mysore was made and planting material of important varieties was collected. Two thousand three hundred and ninety citrus and 879 mango seedlings were grown to serve as stocks and 172 cuttings of ten varieties of grape vines obtained from different localities were planted, besides sowing a large number of seeds from single tree selections of citrus, mango and papaya. Several coolies were trained in budding and inarching. Other items of study included different methods of budding, germination of mango stones, periodicity of bearing of different plants, etc.

At the Pomological Station, Coonoor, 151 trees of different varieties of fruit were planted during the year. The total yield of fruit of all kinds was 10,022 lb. as against 6,513 lb. last year. A large number of peach seedlings were budded, and apples and

pears were grafted on their respective stocks. Seventy plants of apples and pears were successfully grafted to stocks of other genera and species.

At Burliar, the yield of Mangosteen was poor. Over 100 imported grape fruit trees were planted. The orange crop was so poor that it brought down the yield of all fruit in that station from 9,243 lb. last year to 5,552 lb.

At Samalkota, the trial and multiplication of varieties of plantain and their study and classification was continued. At the Central farm, a few more mango and orange trees were added to the existing orchard. Fruit trees suitable to the tract are being grown in different agricultural stations.

(5) Oil seeds.

23. A new station for oil seeds consisting of an area of 49.28 acres was opened at Tindivanam in South Arcot district in June 1935. This station now offers scope for carrying out research on different kinds of oil seed crop important to this Presidency.

(i) *Groundnut*.—Twenty-four selections from spreading varieties of good yield were further tested this year with *saloum*. Only selection No. 193 gave a significant increase of 12 per cent over the control. Varietal trials were also continued. Preliminary trials of a large number of selections both in spreading and bunch varieties were in progress. Interspecific crosses were successfully made between *Arachis hypogaea* and *Arachis rosteiro*, *Arachis rosteiro* and *Arachis nembyquarae* with a view to induce variations and to make selections therefrom. Correlation studies revealed that in both spreading and bunch varieties there is a positive and significant relationship between the average length of the primary branches to the height of the main axis and the weight of the pods. That plants possessing a proportionately short main axis when compared with their primary branches yield well seems to be an established fact. This is a very important and useful observation in a crop whose produce is underground. At Nandyal, a varietal trial showed that *saloum* gave a significant increase of 197 lb. per acre over local. At Palur A.H. 25 under irrigation yielded well at 2,945 lb. per acre.

(ii) *Castor*.—Eighty-five economic selections and 160 types were grown for inbreeding and multiplication. The indication is that the crop has not so far suffered by inbreeding. An estimate of the natural crossing in castor showed that 5.14 per cent of the plants in the progeny were naturally cross-pollinated.

(iii) *Coconut*.—Studies in hybridization, selfing and natural pollination were continued. It is noticed that some trees produce large number of barren nuts. Even artificial pollination of female flowers of 15 trees did not minimize the number of barren nuts. Experiments on artificial pollination also revealed that it does not increase the yield of coconut. An interesting test made in growing seed nuts from different centres of production on the West Coast showed that those from Sivapuram were superior to others,

in their rate of germination and growth. The experiment to study the best position of planting the nuts in the nursery whether vertically, obliquely or horizontally showed that the most satisfactory results for early and total germination were obtained from nuts planted vertically. It is also found that deep planting is preferable to surface planting. Cultural experiments carried out at the station indicated that cultivation should not be neglected even for a short period of 3 or 4 years and that fields left uncultivated even for years respond readily to cultivation.

(iv) *Gingelly*.—Inheritance of seed coat colours, habit and corolla colours of gingelly were under study. It was also learnt that most of the South Indian varieties were subject to the attack of phyllody.

(6) Root Crops.

24. *Potato*.—At the Agricultural station, Nanjanad, work on breeding and selection of potatoes was carried on. Seven thousand nine hundred and two flowers were artificially pollinated and 143 berries obtained and 1,000 seedlings raised. The raising of seedlings has been more successful this year than before owing to the protection given to them from the cold. Row yield and comparative trials were made among 20 varieties of potatoes. In the main crop and in the second earlies, Ben Cruachan and Great Scot were respectively the best. Ten varieties from Russia and five from Scotland were obtained. Of the former only two have survived. Potatoes grown under irrigation and in the main and second crop seasons yielded 484, 633 and 440 maunds per acre, respectively. Manurial experiments were continued.

Other experiments in progress are—

- (i) Influence of size of seed and spacing on yield. Tubers weighing 2 oz. and spaced at 6 inches apart were found to be the most economical this year.
- (ii) Influence of the age of seed and its size on yield. New seed had better vigour and gave higher yield than old seed.
- (iii) Deep *versus* shallow ridging for second crop. Shallow ridging gave 20 per cent more yield than deep ridging.
- (iv) Keeping quality experiment. Tubers obtained from differently manured plots were separately planted to test their keeping qualities.
- (v) Irrigating before and immediately after planting of potatoes with a view to find out if a better stand of crop could be obtained. No difference in yield was noticed confirming last year's observation.

(7) Spices, Condiments and Narcotics.

25. *Pepper*.—The season for pepper was unfavourable at the Taliparamba agricultural station. Investigations on the manurial requirements of pepper were continued on the station.

Chilly.—At Guntur, selection and economic work is in progress. Six strains are in the second year of comparative trial. Strain Nos. 367, 390, 393 and 399 showed significant increases over the local. These types are also tolerant to thrips. Seed of the promising types is being multiplied. Crosses between plants possessing persistent and loose calyx and between hairy and glabrous types were also made.

Tobacco.—At Guntur, out of four strains under trial in cigarette tobacco, H.S. 8 has given 2.3 per cent increase over the local Harrison besides being superior in quality. Selections from other Virginia tobaccos are under trial. F.2 progenies of six different crosses between indigenous and exotic types as well as those among exotic types are under study for inheritance of morphological characters. Beedi tobacco from Ceded districts and Hooka tobacco from Pusa are being acclimatised.

(8) Sugarcane.

26. Aided by the grant given by the Imperial Council of Agricultural Research, an agricultural station was opened at Gudiyattam in February 1935. The fields having been laid out into suitable plots, varietal studies in regard to their germination, root development, growth habit of flowering and ratooning were begun. At Anakapalle, there were 97 varieties under trial. In regard to habit, it is found that there is no variety to beat Co. 213 while Co. 313, otherwise a very promising cane, is disappointing in this character. Taking all aspects of study of these varieties into consideration Co. 313, 419, 421, 602, 381 and POJ. 2878 are promising. Experiments in the time of planting and in irrigation were continued as in previous years. In the ratooning experiment, Co. 243 and Co. 281 gave good yield in wet lands whereas M.A. 221 and J. 247 fared badly. Spacing, manurial, planting of seedlings *versus* setts, and trials of different sugarcane mills are other experiments in progress.

At Samalkota, 47 varieties were under study. In the thick cane trials Co. 419 and 412 gave an increase of 68 and 20 per cent, respectively over J. 247. Of the seven varieties which were given only a single irrigation during their growth, Co. 210 and 419 and POJ. 2878 withstood summer better than the rest. The experiment started last year on trench planting *versus* bed planting continued this year but the results this year do not confirm those of last year on account of the unusual rains received in April and May. Trench planted plots did not thrive so well as those in beds. Ratooning trials indicated that thin canes are better suited for ratooning than thick canes.

At Palur, of the 38 varieties under study, 7 were carried forward for further study. The results of the manurial trials confirmed the findings of the previous year. Two hundred pounds of nitrogen as cake and ammonium sulphate supplemented by potash and phosphate gave the highest tonnage. In the ratooning experiment, the difference in favour of the planted crop was as much as 17.81 tons. An irrigation experiment showed that Co. 213 resisted drought best and that Co. 285 and 243 were also promising whereas P.O.J. 2878 did not behave satisfactorily under these conditions.

(9) Miscellaneous Crops.

27. (i) *Soya Beans*.—Forty samples obtained from South Africa and tried at the Millet Breeding station did not do any better than the six varieties under trial at Coimbatore. At Aduurai where a large number of varieties of this crop are under trial, it is believed that there is a bright future for their introduction in the Tanjore delta.

(ii) *Redgram*.—Several cultures were grown for the study of earliness, prolificity and size of seed. Several varieties were tested for their cooking qualities.

(iii) *Bengalgram*.—Three strains from Cotton Breeding station were distributed in the districts for comparative trial. They were reported to have done better than locals at the Central Farm, Udamalpet, Dharapuram and Northern Circars. Useful and interesting information was obtained in regard to inheritance of seed, colour surface and shape.

(iv) *Cowpea*.—Six hundred and eighty-four units of selections from varieties collected from different parts of the Presidency last year and fresh importations from Kew, Australia and South Africa were grown. Varietal and inheritance trials are in progress at the Millet station.

D.—Horticulture.

28. This work is mainly confined to Botanical Gardens at Ootacamund and Coonoor. At Coonoor 136 rose standards were budded and 222 Briar roses were planted as stocks for the future. Tung oil plants are making satisfactory progress. Cultivation of medicinal plants was extended during the year at Ootacamund and *Ipomoea purga* (Jalap), *Digitalis purpurea* (Foxglove) *Lobelia inflata* Indian (tobacco), *Barosma betulina* (Buchu) and *Chrysanthemum coccineum* (*Pyrethrum roseum*) were under trial. Other crops that were tried were Kikyu grass and varieties of edible lupin.

E.—Implements.

29. The Research Engineer section was engaged in the designing and improving local implements. Progress was made in the development of light ridge ploughs several of which have been successfully tried in the districts. A water lift received from a company in Poona giving out an output of 6,000 gallons an hour is under trial in a village in Coimbatore. The improved circular

mhote to which reference has been made in the previous reports is now ready for installation and demonstration on ryots' lands in districts where the water table is high. A turmeric polisher was constructed and put to test on ryots lands in Coimbatore district. The cost of treatment by this polisher is reckoned as Rs. 1-5-3 for a quantity of 17 pothies as against Rs. 6 with indigenous method of shaking in hanging bamboo baskets. Comparative speed trials on a rubber tyred cart compared with an ordinary country cart carrying a load of 1 ton on a well metalled road showed an increase of 16.8 per cent in speed in favour of the rubber tyred cart. Experiments are underway for making a grain polisher in order to devise a simple and effective way of removing the seed coat from the yellow variety of sorghum which is being used in connection with malting experiments by the Agricultural Chemist. The same machine seems effective in the de-fibration of cotton seed. Three groundnut decorticators were under trial.

F.—Livestock.

30. The number of livestock at the Hosur Livestock station at the end of the year was 634 as against 617 in the previous year.

Cross-bred herd.—The main purpose of this breed is to supply milk for the College dairy at Coimbatore where most of the cows in milk are kept. These are mated to Scindhi bulls in order to breed back to the indigenous breed. At Hosur and Coimbatore, the average milk yield per cow per day was 15.1 and 15.5 lb., respectively. The average performance of some individual cows was 23 lb.

Scindhi herd.—As stated in the previous year, the demand for this breed is continually on the increase. A herd of 33.7 cows in milk produced on the average 12.4 lb. of milk per cow per day as against 12.7 the year previous. The performance of individual cows at the bucket was over 6,300 lb. in a lactation. The necessity for extending this important milch herd is obvious in view of the demand.

Kangayam herd.—This is one of our best draught breeds. Attempts are being made by selection to improve the milk yield also. There were 58.3 cows on the average which gave 6.9 lb. of milk per cow per day; one cow however gave a daily average of 14.7 lb. indicating what room there is for improvement in this direction. There were 292 animals of this breed of which 29 bulls, 19 cows and 8 calves were sold.

Hallikar herd.—This is another draught breed, the foundation herd of which was purchased from Mysore last year. There were 37 animals in the herd. The average yield of milk per cow was 5 lb. per day.

During the year 42 breeding-bulls, 45 cows and 15 calves were disposed of for breeding purposes, apart from the sale of a few surplus cows of the Kangayam breed at the Tiruppur cattle show.

Ongole herd.—At Guntur, 13.6 Ongole cows were maintained during the year. There were 6.9 cows in milk whose average yield per cow was 6.9 per day. Cow No. 95 H. gave 4,841.7 lb. of milk in a lactation with an average of 18.2 lb. per day.

Buffalo herd.—At Guntur, only a very limited number is maintained. There were 3.6 buffaloes in milk throughout the year which yielded 14.6 lb. a day each. Buffalo No. 58 gave 7,560 lb. of milk in a lactation with a daily average of 17.2 lb.

Bellary sheep.—At Hosur, there was a flock of 123 sheep at the end of the year as against 144 last year. The average yield of wool per sheep was 3.25 oz. for the year.

Poultry.—The same breeds as in previous years were maintained at Hosur. Several agricultural stations also kept different breeds. In all, 955 birds were maintained which laid 33,124 eggs. There is a very large demand for exotic birds in different districts but unless the question of disease is tackled at once, it does not seem to be the right thing to encourage people to multiply these breeds, as diseases over which there is at present no control, sweep flocks by the night leaving the beginners in poultry farming disheartened.

G.—Entomology.

31. The pests that received serious attention during the year were the paddy stem borer, paddy army worm, pests of tomato and fruit, cotton boll worms, cotton stem weevil, moth borers of sugarcane, etc. In regard to the army worm the investigations are again suggestive of the great influence that micro-climatic conditions exert on the moths which are attracted in large numbers all on a sudden within 3 or 4 days of the sowing and germination of the crop. The most serious pest of tomato was the fruit-sucking moth.

An examination of the position of the fluted scale on the Nilgiris against which a predator—*Vedalia cardinalis*—was liberated, revealed that in the majority of cases whenever the scale were present the predators were also in evidence.

A fair number of insecticides were under trial during the year. The addition of citronella oil to the dung in the house fly trap attracted flies in larger numbers than otherwise. Forty bee colonies were maintained at Coimbatore. Three apiaries were kept at different places on the Estate to provide sufficient pasturage for them. Investigations on bee pasturage, control of natural enemies, swarm control, egg laying capacity of the queen, etc., were continued.

H.—Mycology.

32. In the mosaic varietal resistance trials, out of the 28 varieties tried, Co. 353, 411, 412 showed a high degree of resistance while varieties like Co. 313, 331, 361, 419, 426, etc., showed infection ranging from 40–60 per cent. It has been investigated that sugarcane mosaic is not transmitted through the cane seed.

In regard to tobacco black shank disease, 14 varieties were under trial for resistance to the fungus. The yellowing of cholam has been found to be due to a virus disease and that it is transmitted by an insect vector. A disease of areca palm hitherto unrecorded in South India has been noticed in Murkanad in Malabar. Spraying with a solution of zinc sulphate and hydrated lime in water has given satisfactory results in controlling *citrus Foliocellosis*. Spraying experiments were conducted at Michaelpatti in Madura district in the control of grape vine mildew showed that coconut, groundnut and neem oil were effective as spreaders when used with Bordeaux mixture.

I.—Trial Plots.

33. *Paddy.*—During the year 913 trial plots were conducted on paddy, ragi, groundnut, sorghum, cotton, sugarcane, wheat, chillies, *Tenai* and Bengalgram, as against 669 during the previous year. In the I Circle paddy strains *Mypali* No. 7 and 30, *Konamani* strains No. 3 A, 83 and 87, *Bayyahunda* No. 1, *Sankisannam* No. 5 and *Basangi* No. 61 gave increased yield over local varieties ranging from 6.9 to 18 per cent. Under semi wet conditions, M.T.U. 4 gave 664 lb. of grain per acre where *Budama* failed to give any yield. In the II Circle, *Atragada* strain No. 4717 gave 6 per cent and 10 per cent increased yield over local in two places, while M.T.U. 8 gave a 14 per cent increase over local *Vankisannam*; and *Garikasannavari* strain No. 4418 gave 32.7 per cent increased yield over the local second crop paddy. In the V circle, *Chitrakali* and Adt. Nos. 8 and 9, gave 17, 14, and 14 per cent increased yield over local *Kuruwai*, Adt. No. 2, local *Kuruwai*, respectively while *Sanna Samba* strain No. 693 gave 15 per cent more yield than the standard. In the VI circle, *Senthinayagam* paddy strains Nos. 2975, 2976 and 10440 gave higher yields than local by 8 to 11 per cent. In Salem, T. 670 from Bengal tried against G.E.B. 24 gave an increased yield in 5 out of 6 plots and in the other two cases 20 per cent increased yield was obtained.

Ragi.—E.C. 593 was compared with T. 8, H. 22 and locals in the III Circle. The results are significantly in favour of E.C. 593. In the V circle also it gave a 15 per cent increased yield.

Groundnut.—A.H. 25 *Saloum* groundnut tried in the I, II, V VI and VIII circles gave increased yields ranging from 8 to 20 per cent over locals. A.H. 45 also gave 42 per cent and 10 per cent increased yields in II and V circles respectively.

Sorghum.—T. 6 *Jonna* when tried in the II circle in the *pyru* season gave an increased yield of 60 lb. per acre over local. In the VI circle, As. 2095 and 367 fared better than local in spite of the attack of ear-head bug.

Cotton.—The trial of Cambodia cotton in the I circle referred to in last year's report was continued. This year it gave 741 lb. of kapas per acre under irrigated conditions while as a rainfed crop it gave an average yield of 208 lb. per acre.

Cocanada strain No. 171 released for distribution and seed multiplication in II circle gave on the average 16 per cent increased yield over the local, besides possessing some superior characters.

Fifteen *Mungari* cotton selections were tried in 5 taluks of Bellary division of the III circle. H.1 was found superior to No. 14. The results of E.B. 31, Verum 434, 438 and late Verum were also encouraging.

Karunganni cotton strains 2529, 2681 and 1682 were tried with 2622 (K.P.T.) as control in the VI circle. So far, the control has given better results.

Of the Cambodia cotton strains tried in the VI circle, strain No. 1742 A. gave 1,321 lb. of kapas while C.S. 1267, C.S. 920 and Co. 2 gave 1,209 lb., 1,179 lb. and 1,153 lb., respectively.

Sugarcane.—In the I Circle, Co. 213 under normal irrigation gave 7,725 lb. of jaggery while Co. 313, Co. 243, Co. 281 and P.O.J. 2878 gave 7,550, 6,850, 6,250 and 7,300 lb., respectively. This trial will be repeated in bigger plots. Co. 351, a sorghum hybrid gave 9,167 lb. of jaggery as compared with Co. 213 which yielded 9,700 lb. under normal conditions while Co. 356, another sorghum hybrid gave 9,500 lb. per acre.

Wheat.—Pusa 52 wheat has done well in parts of Coonoor taluk yielding 50 per cent more than the local.

Chillies.—Bulk 2 selected in Agricultural Research station, Guntur, out of the Pusa varieties and Pusa No. 9 as an irrigated crop gave 15 and 25 per cent more yield respectively than the local in the II Circle.

Tenai.—Strain No. 544 tried in the VI Circle gave 107.5 lb. more grain per acre than the local.

Bengalgram.—Several strains of Bengalgram have been tried in the VIII Circle. Strain No. 468 gave increased yields up to 32 per cent with an average of 15 per cent over four places.

Fruits.—Manurial trials with citrus fruits were conducted in III Circle and with grape vines in the VIII Circle. In the III Circle, a mixture of 50 lb. of cattle manure, 5 lb. bonemeal, 2 lb. ammonium sulphate, 2½ lb. of potassium sulphate and 3½ lb. super-phosphate as against 200 lb. cattle manure per tree gave an increased yield of 10 per cent. The manurial and irrigation experiments at Krishnagiri on grape vine gave an increased return of Rs. 145 per acre after deducting the cost of manure.

V.—DEMONSTRATION.

34. As during the year the activities of the demonstrators continued to be extended to a larger number of central villages, the number of demonstration plots increased and their distribution spread over a wider area. During the year, there were 7,214 demonstration plots as against 3,170 during last year. These plots were organized mostly to demonstrate varietal, cultural and manurial improvements, on paddy, sugarcane, ragi, groundnut and fruit plants. They have served their purpose and shown

economic advantages of the improvements suggested by the department. As will be seen from the report the progress in many items of propaganda has been marked.

For an intensive development of demonstration work in villages a scheme for the appointment of 63 demonstration maistries for a period of five years from 1st May 1935 was sanctioned by Government as an experimental measure. The scheme was worked in nine taluks of the Vizagapatam district in the first instance. Men mostly with middle school standard of education were selected at seven maistries for each taluk to provide assistance to the agricultural demonstrators. These men before appointment were given intensive training for a short period at the Agricultural Research station, Anakapalle.

A comparative statement showing the extent of improvements effected during 1935-36 as compared with that of 1934-35 in the taluks under the scheme is given below :—

Items of improvements.	Extent during 1934-35.	Extent in 1935-36.
	ACS.	ACS.
1 Interculturing sugarcane ..	381	838
2 Raising short crops of sugarcane.	69	129
3 Improved furnaces constructed.	123	465
4 Jaggery making demonstration.	622	905
5 Introduction of improved paddy varieties and strains.	96,313	72,515
6 Early preparation of paddy seedbeds.	2,242	2,647
7 Planting of thin sown seedlings.	42,643	29,496
8 Green manuring ..	23,811	4,768
9 Application of bonemeal or super.	6	73
10 Sowing groundnut in every furrow.	1,343	2,859
11 Grading Jonna seed ..	30	563
12 Treatment of Jonna seed against smut.	57	602
13 Manure heaps and pits covered properly.	4,185	17,115
	No.	No.
14 Conservation of urine ..	2,250	6,829
15 Cooper No. 11 ploughs arranged to be sold through Takkavi Loans.	315	492
16 Aswani Kumar Mondal Sugarcane mills.	44	292
17 Demonstration plots ..	654	1,582
18 Trial plots ..	76	237

REMARKS.—* The paddy season was a failure.

With a view to improve the general condition of the villagers these demonstration maistries have been trained to persuade villagers to use latrines and keep streets clean; besides to read to them at nights some useful literature dealing with health, education and civic life and to start village improvement associations.

By the intimate contact formed between the ryots and the maistries as a result of the introduction of the scheme, ryots in all the taluks have begun to appreciate the services of the department and take advantage of the presence of the maistries amidst them. Though only 11 months old, the schemes may be considered to have started off fairly well on the whole; it is, however, too early to judge the results.

Exhibitions and Shows.

35. Exhibitions and shows were held, as in the past on occasions like cattle fairs, jamabandi camps, health week celebrations and district co-operative conferences. The number so held during the year was 195 as against 178 of last year. As usual large scale exhibitions were staged at the Annual Park Fair at Madras organized by the South Indian Athletic Association and during the Vaikunta Ekadasi festival at Srirangam. A model farm house with necessary equipment of improved cattle sheds, manure pits, dairy, poultry and apiary, an orchard of properly spaced fruit-trees and demonstrations connected with the cultivation of sugarcane and manufacture of jaggery were put up at Srirangam. On the occasion of the formal opening of the fruit research station, Anantarajupet in Cuddapah district by the Hon'ble the Minister for Public Works, an exhibition of fruits was arranged. This was visited by over 3,000 ryots interested in fruit culture. The District exhibitions held at Palakonda and Narasannapetta in the I Circle attracted a large number of ryots with their exhibits and created a good deal of interest in the departmental activities. Of the 16 Agricultural Exhibitions held in the II Circle, the outstanding one was that held at Nellore where crops of educative and economic value were actually grown in small beds. Improved methods of conserving cattle manure and the working of archmedian screw water lift, and sprayers were demonstrated. The department was awarded three gold medals for its interesting collection of exhibits.

Two thousand eight hundred and forty-five lectures with and without the aid of magic lantern were delivered during exhibitions, jamabandi camps and itinerary of the motor exhibition vans.

The three motor exhibition vans toured throughout the Presidency except in the I and II Circles and the Nilgiris district.

Items of Propaganda.

(1) Crops.

36. (a) *Methods of cultivation.*—Paddy is the main crop in this Presidency. Due to fall in prices its cultivation at present is not so remunerative as it was some years ago. In spite of it, it was not replaced by other remunerative crops to any large extent due to various limiting factors. Hence in addition to advocating growing of money crops such as cotton, sugarcane, turmeric, plantain, etc., in rotation with paddy, wherever conditions permitted, every effort was made to teach ryots to increase the outturn of paddy with the minimum expenditure by following departmental methods. Of these improved methods, reduction of seed rate in the paddy nursery, and economic transplantation are two important items of propaganda. In Vizagapatam division of the I Circle, the work in this direction was very badly handicapped for want of sufficient and timely rains. In Rajahmundry division, fair progress was made on account of the favourable season. In the II, III, V and VI Circles, the reduction of seed rate was as much as 40 to 50 per cent of that adopted by ryots some years ago. The total area under the improvement in the Presidency is estimated to be 1,174,818 acres.

In regard to sugarcane, improved methods of cultivation include line planting, trenching and wide spacing. These improved methods have been adopted throughout the Presidency over an area of 36,103 acres during the year.

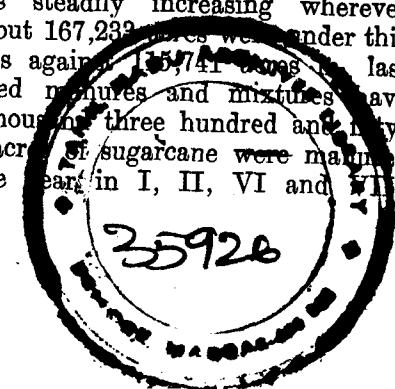
The drill sowing of Karunganni and line sowing of Cambodia cotton are spreading in V, VI and VIII Circles. By the adoption of the above methods a saving in the quantity of seed used is effected and intercultivation by bullock power can also be practised. The area under this improvement was 23,672 acres as against 18,218 acres of last year.

Sowing of groundnut in every furrow instead of in alternate furrows was done in an area of 3,802 acres as against 1,554 acres during last year in the I Circle. Demonstration in the II Circle with H.M. Guntaka No. 2 for lifting groundnut resulted in a saving of Rs. 2 and Re. 1 per acre in Bapatla and Challapalli sub-circles respectively as compared with local methods.

Intercultivation of plantains and coconut topes was advocated. Two hundred and ninety-six acres in the II Circle and 520 acres in the V Circle were brought under this improvement.

(b) *Methods of manuring.*—The practice of green manuring paddy and sugarcane crops is steadily increasing wherever possible. It is estimated that about 167,232 acres were under this improvement during the year as against 157,741 acres in last year. Good sales of concentrated manures and mixtures have also been reported. Forty-one thousand three hundred and fifty-two acres of paddy and 13,430 acres of sugarcane were manured with these fertilizers during the year in I, II, VI and VIII Circles.

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Application of phosphates along with local manure has been found to increase the yield and improve the size of plantains. One thousand and sixty-three acres were thus manured in the V Circle.

About 400 tons of fish manure were used by ryots for manuring tobacco and sugarcane crops in the VII Circle.

(c) *Seed distribution—Cotton—(Cambodia).*—Three hundred and eleven thousand nine hundred and eighty-six pounds of Co. 2 Cambodia cotton seed were distributed by the department during the year for seed purposes of which 183,663 lb. were in the VIII Circle. In addition to this 1,009,471 lb. of good quality seed were sold to the ryots for sowing in Coimbatore district under the Co. 2 seed multiplication scheme financed by the Indian Central Cotton Committee and run in conjunction with the Tiruppur Co-operative Trading Society. Besides, many of the merchants and ginning factories are following the methods adopted by the department in the production of good seed and as ginning factories have sprung up all over the Coimbatore district, they are having an appreciable effect in maintaining the supply and spread of Co. 2 seed.

To meet the growing demand of this seed, besides the 5,320 acres of seed farms under the Co. 2 seed multiplication scheme, 883 acres of seed farms in the VIII Circle and 199 acres in the VI Circle were arranged by the Department.

The total area under improved strains of Cambodia cotton in the Presidency is estimated to be 213,339 acres as against 121,466 acres last year.

Karunganni cotton.—One thousand two hundred and seventy-six acres of seed farms were arranged in the VI Circle and 189,395 lb. of seed were distributed as against 133,785 lb. in the previous year. In the VIII Circle, 54,492 lb. of seed were obtained from 744.95 acres as seed farms of which 51,562 lb. were distributed within the circle apart from 6,160 lb. of A. 10 Karunganni cotton seed. The area occupied by this cotton in the V, VI and VIII Circles is estimated to be 182,255 acres as against 152,456 acres in the previous year.

'Westerns' cotton.—The area under seed farms of H. 1 cotton is 3,265 acres. During the year 62,520 lb. of seed were distributed including the quantity issued to seed farm ryots. About 50 per cent of the area under cotton in Prodattur taluk, Cuddapah district, is reported to be under this strain. The area under this strain in the III Circle is estimated to be 220,000 acres as against 206,200 acres in the previous year.

'Northerns' cotton.—In view of the desire expressed in certain quarters for the cultivation of N. 14 cotton, seed farms were again started in Kurnool district in about 90 acres. But so long as the firms grudge to pay a satisfactory premium for the

better quality of N. 14 lint, the progress it can make must necessarily be slow. The Department is endeavouring to evolve a strain combining in it the high quality of N. 14 and the heavy yield if the Gadag mixture.

Coconut.—On account of the unfavourable season, the yield of coconut considerably went down during the year. Despite financial depression and low price for nuts, new areas were planted to a limited extent and the demand for seed nuts and seedlings produced at the coconut research stations on the West Coast was great. During the year 10,884 seed nuts and 4,690 seedlings were supplied from the research stations and reliable nursery men. Propaganda work consisted in advising ryots to intercultivate their gardens, adopt proper spacing in new plantations, raise green manure crops and apply phosphatic manures. Five hundred and twenty acres were intercultivated and 64 acres were manured in the V Circle.

The deputation of an agricultural subordinate to the Laccadive islands to demonstrate improved methods of cultivation was stopped during the year. The appointment of three demonstration maistries to be permanently stationed at the islands was sanctioned by the Government and three islanders who were trained at the coconut research stations on the West Coast were appointed and sent to the islands to work under the supervision of the amins and monegars.

Groundnut.—A. H. 25 is becoming popular in all the circles due to its high yield, short duration nature and the ease in lifting. As its yield is consistently good the area under it is expected to increase. Eleven thousand one hundred and seventy-one pounds of groundnut seed were distributed during the year. H.G. 1 and A.H. 45 have also done well in the II, IV and V Circles.

* *Korai cultivation.*—Owing to water scarcity and fall in price of finished articles and raw materials, the area under korai in North Arcot district has gone down very much. Attempts made to introduce the crop in II and III Circles have not been successful so far.

Paddy.—During the year, progress in the spread of the strains has been tangible. The total amount of paddy seed sold and made available to ryots was 2,479 tons as compared with 1,567 tons last year. Besides the production of seed directly by the department, large areas of seed farms on ryots' land under departmental supervision were arranged. In the I Circle, the extent of paddy seed farms was 3,932 acres and the total production of seed from this area was 2,624 tons. In the II Circle, seed of improved varieties sufficient to sow 14,283 acres was distributed under departmental agency and 136,235 acres by ryots. The area under G.E.B. 24 went up to 22,600 acres during the year as against 15,865 acres in the previous year. One hundred and thirty-three acres of seed farms were maintained in the IV Circle

and about 53 tons of seeds were made available to ryots. In the V Circle, 35 tons of seed were sold by the Department and about 350 tons by ryots and Co-operative Agricultural Societies. A strain from Katta Samba released three years ago from Aduturai is becoming popular in this circle and occupied an area of 6,110 acres. In spite of the very severe attack of blast this year the strain maintained its superiority. In the VI Circle, 615 acres of seed farms were arranged and seed sufficient to plant 30,000 acres was made available in the three popular strains, G.E.B. 24, Co. 2 and AEB. 65. On the West Coast about 22 tons of seed were distributed by the department and about 65 tons by ryots. The total area in the Presidency under different improved strains of paddy including the natural spread is estimated to be 1,277,583 acres as compared with 850,415 acres in the previous year.

Onion.—During the year over 229 lb. of seed sufficient to plant about 60 acres were distributed by the Department in different circles; a considerable amount of the seed was, however, obtained by merchants direct and supplied to ryots. In Salem, attempts are being made to produce seed with a view to make the area self-contained.

Pepper.—Propaganda to spread the cultivation of pepper in South Kanara was continued. During the year 15,500 cuttings were distributed and assistance rendered in the proper methods of planting. In Malabar, there was a demand for over 25,000 cuttings from good bearing vines.

Potato.—Fourteen hundred and two maunds of potato seed were issued on seed farm conditions in 39 villages on the Nilgiris, besides selling 27,527 lb. to ryots. As there is a decided preference among ryots for Great Scot, its distribution will be increased. In Hosur taluk, 1,525 lb. of this variety were sold. Twenty-five maunds of Great Scot and Royal Kidney were tried in Madanapalle and Palmaner taluks of Chittoor district with good results. The area under improved varieties of potatoes in the Nilgiris is estimated to be 12,508 acres and the total quantity of seed distributed during the year in the different circles amounted to 66,012 lb.

Ragi.—The unfavourable season in the I Circle was responsible for limiting the spread under ragi strains evolved at Anakapalle. T. 8 and EC. 593 have done well in the III Circle where 739 lb. of seed of the former and 150 lb. of the latter were distributed during the year. Seed distributed during the year in the various circles amounted to 8,095 lb. and the total area in the Presidency under different improved strains is estimated to be 10,073 acres.

Sorghum.—During the year 9,729 lb. of seed of T. 1, T. 6 and N. 29/68 evolved at Hagari and Nandyal were distributed in the III Circle. The area in this circle under these strains is estimated to be 101,105 acres. T. 6 Jonna demonstrated in the II Circle in the *pyru* season gave an increased yield of 60 lb. per

acre over the local. The seed of this variety is being multiplied in view of its fodder value also. Over 10,000 lb. of seed were distributed to the VIII Circle where *Peria Manjal Chulam* and T. 1 and T. 12 are becoming popular for fodder.

Sugarcane.—With the fall in the price of paddy, extension of cane cultivation is becoming increasingly important. The area under it is slowly increasing especially in the vicinity of sugar factories with the result that the demand this year for setts of improved varieties was very great. During the year 1,241,296 setts were distributed by the department from the various agricultural research stations. In order to make ryots grow their own seed material, they were encouraged to propagate seed by the 'short crop' method in their own lands and to enable them to do so 13,872,880 setts were made available in the I Circle, while in the IV Circle 51½ acres were under this system. J. 247 and purple Mauritius continue to be popular in the I Circle and the area under the former was 12,123 acres. Co. 213, though successful in the uplands and in the lighter type of soils, does not seem to yield to the same appreciable extent as purple Mauritius in the heavy soils of Godavari delta. The area under sugarcane in the II Circle came down from 7,900 acres in previous year to 4,985 acres as the sugar factory at Vuyyur was not in a position to utilize the canes grown by ryots in 1934-35. The area under Co. 243 has been on the increase in the circle. In the circles included in the southern districts, the area under improved varieties of sugarcane has increased from 6,683 acres to 9,978 acres. The total area in the Presidency under different improved varieties was 39,597 acres as compared with 40,262 acres in the previous year.

The progress made in the construction of improved furnaces for making jaggery was remarkable, the number constructed during the year being 1,230 as compared with 387 in the previous year. Five hundred and forty-seven demonstrations on the method of preparing good jaggery were also arranged. Three hundred and twenty-three bullock mills and four power crushers were sold in the I Circle.

Tapioca.—The cultivation of superior varieties of tapioca is spreading in the VII Circle. During the Industrial and Agricultural Exhibition at Mangalore, tapioca and its products were exhibited, with the result that 136,355 cuttings were supplied during the year. In Wynaad, 30 acres have been planted as against 15 acres in the previous year.

Tobacco.—Cigarette tobacco of the Virginian type is spreading in the II Circle, the area in Kistna district alone being 3,000 acres. Eighty-seven acres were under H. S. 9, a strain evolved at the Agricultural Research station, Guntur. It fetched a premium of Rs. 10 per candy of 500 lb. of cured tobacco on account of its superior quality.

Wheat.—There has been a desire to try wheat in certain parts of the Presidency. Irrigated variety of wheat of Coimbatore district was successfully tried in the Udayagiri taluk of Nellore district.

(2) Fodder.

37. The severe drought experienced during the year gave an impetus to the increase of area under fodder crops such as cholam, sunnhemp, pillipesara, etc. The introduction of the pillipesara crop has helped a great deal in solving fodder problem in the I and II Circles where it is grown over an area of 16,000 and 21,000 acres respectively. The introduction of elephant, guinea and kolukattai grasses, lucerne, maize, teosinte and sunflower was also continued. In the IV, VI, VII and VIII circles, 37,522 slips of various grasses, 332 lb. of kolukattai grass seed, 5,550 lb. of cholam seed besides fair quantities of seed of teosinte, maize, lucerne and sunflower were distributed. Fourteen demonstrations were held in the VII Circle to show the ryots the proper method of preparing hay from hill grass while silage preparation was demonstrated at six places in the VI and VII Circles.

(3) Fruits.

38. As in previous years, advice on the selection of suitable fruit trees, their correct method of planting, pruning, intercultivating and manuring and control of pests and diseases was continued to be given. In the I Circle, improved methods of cultivation of plantains were demonstrated on 655 acres and an area of 580 acres was planted with fruit-trees such as mango, citrus, pine-apple, sapota, guavas, while in the II Circle 296 acres were intercultivated and 135 acres manured with oil cakes and phosphatic manures. The following were sold by the department during the year :—

Plantain suckers	...	...	...	231,436
Pine-apple suckers	...	...	...	57,700
Mango grafts	...	...	...	35,174
Miscellaneous fruit plants	...	...	...	66,018

(4) Implements.

39. The progress reported in the previous years in the sale and demonstration of different kinds of agricultural implements was maintained, the number of demonstrations conducted being 12,897 as against 12,111 in the previous year. In order that improved implements may be within easy reach of poor ryots, takkavi loans are granted freely. This system is finding favour

among ryots. During the year, the following implements were sold by the department :—

Iron ploughs	...	...	...	3,102
Guntakas	...	...	...	64
Roll easy mhote wheels	...	...	...	503
Chaff cutters	...	...	...	11
Persian wheels	...	...	...	9
Bund former	...	...	...	27
Planet junior hoe	...	...	...	10
Buck scraper	...	...	...	3
Sprayers and dusters	...	...	...	119
Water lifts	...	...	...	5
Sugarcane mills	...	...	...	17
Archimedian screws	...	...	...	4

(5) Livestock.

40. The number of premia breeding bulls at the end of the year was 140, including 20 new bulls purchased by the District Board, Coimbatore, for which the department paid a contribution of Rs. 2,000. These bulls are entrusted to ryots who maintain them and at the end of two years they become the property of ryots provided the conditions in regard to maintenance and service are satisfied. The Assistant Agricultural Demonstrator, Livestock, in charge of the breeding bulls stationed in Madras at the Veterinary College, inspected 326 calves and continued his weekly inspection of General Hospital Dairy.

Poultry.—The interest of the ryots in poultry especially of the exotic types is on the increase. During the year, 3,651 eggs and 694 chicks of good breeds were supplied to the ryots as against 2,227 eggs and 207 chicks in the previous year.

Apiary.—A lively interest has been created among ryots in bee-keeping. It is estimated that about 1,000 improved types of bee-hives are maintained in the Presidency.

(6) Loans.

41. Takkavi loans were granted during the year to ryots to the extent of Rs. 15,910 for the purchase of agricultural implements mentioned below as against Rs. 15,067 granted in the previous year.

Description.	Amount.
	RS.
1. Iron ploughs and parts	9,228
2. Water lifts (Persian wheels)	3,300
3. H. M. Guntakas and parts	215
4. Mhote wheels	2,560
5. Spraying machines	344
6. Miscellaneous implements such as chaffcutters, bundformers, cultivators pruning tools, etc.	263
Total	15,910

There was a large demand for loans for the purchase of water-lifts; several applications were sent to the Tahsildars for disposal under general rules under the Madras Agriculturists' Loans Act.

(7) Manures.

42. *Farm yard manure*.—The number of improved manure pits maintained during the year has more than doubled. The first circle lays claim to the largest number owing to the intensive work done by 63 demonstration maistries employed in the Vizagapatam district. The progress in other circles was also fair as will be seen from the figures given below :—

	1935-36.	1934-35.
Manure pits	28,586	13,166
Dry earth sheds	10,516	5,069
Loose boxes	42	117

Compost.—The conversion of night soil into poudrette by the modified Indore process was demonstrated, and the question was discussed with several municipalities. The municipalities that interested themselves in this matter were those of Kurnool, Nandyal, Bellary and Calicut. The experience of the Calicut Municipality in this connection is interesting. It gave the compost free to ryots cultivating paddy and this department met the cost of transportation and application. For the succeeding paddy crop, the ryots contributed half the cost of transport and seeing the successful results, they have now consented to bear the whole cost of transport and application. During the year the number of compost pits rose from 1,250 to 1,683.

Green manures.—The introduction of green manure crops like dhaincha, sunnhemp, pillipesara, wild and ordinary indigo in wet lands was encouraged wherever possible. It is a welcome sign that the stocking of this seed was mostly in the hands of private agencies with the result that the seed sold by the department was only 100 tons as compared with 314 tons distributed last year. In the I and V circles alone 188 tons of green manure seed was sold by such agencies.

Artificial manures.—The use of artificial manures in combination with bulky organic manures was advocated as in previous years and good sales have been reported.

(8) Pests and Diseases.

43. The Entomology and Mycology demonstrators attached to the circles attended to cases of insect pests and diseases which came to their notice and rendered remedial measures. The total number of calls during the year was 438. Seed treated with sulphur dust against smut on sorghum was sown to 12,606 acres in the I and II circles. Tobacco dust was found to be the best remedy for controlling paddy leaf hopper which appeared in a serious

form this year in the West Godavari. Control measures against thrips on chillies in the VI circle increased in yield by 22.65 per cent over the control. Mahali disease of arecanut appeared in a virulent form in most of the arecanut growing villages in South Kanara district. Bordeaux mixture was sprayed on 3,85,000 trees as against 1,16,150 trees in the previous year. Six thousand four hundred and forty-five palmyra trees were operated in Palghat taluk against budrot disease.

(9) Agricultural Marketing.

44. The marketing section consisting of a Provincial Marketing Officer and three Assistant Marketing Officers financed by the Imperial Council of Agricultural Research according to programme outlined by the Agricultural Marketing Adviser to the Government of India was fully engaged on the marketing survey of wheat, linseed, tobacco, groundnut, eggs, rice, grapes, bananas, apples, cattle, milk, hides and skins. Final reports on the first five commodities were submitted by the end of the year to the Agricultural Marketing Adviser. Reports on the other commodities were under preparation. The marketing staff visited several centres of production and consumption. They interviewed over thousand persons engaged in the production, manufacture and distribution of commodities included in the programme. Crop and livestock maps showing the distribution by districts and taluks in the Presidency, in respect of all the commodities under survey were prepared and sent to the Agricultural Marketing Adviser. One thousand one hundred and eight market samples of the commodities were collected from various market centres and sent to the officers engaged in analytical work.

The Marketing Officers were also engaged in the collection of weekly prices of commodities and preparation of price charts and furnishing information to producers, merchants and trade association on the disposal of produce and movement of commodities. Over fifty such enquiries were dealt with during the year.

The Provincial Marketing Board held two meetings during the year and discussed several subjects of provincial importance, for example, on Co-operative marketing societies, construction of warehouses and short loans on standing crops and produce. The South Indian Railway Company expressed their willingness to lease out their land for the construction of warehouses on certain conditions. Consultations with the Railway companies resulted in the reduction of freight charges on plantains from half parcel rate to one-third parcel rate to certain stations in North India as an experimental measure.

At the meeting of the Provincial and Central Marketing staff at Delhi in April 1936, it was agreed that development work should be deferred till the finishing up of the survey reports of all the commodities and that the staff engaged at present should concentrate on the first part of the programme of survey of commodities.

Work through other agencies.

(1) Co-operation.

45. Eighteen thousand maunds of jaggery and 12,084 bags of groundnut valued at about Rs. 2,40,000 were sold by the co-operative sale and loan societies at Anakapalle, Bimlipatam and Vizagapatam. Besides the Sugarcane Growers' Co-operative Society at Bobbili which started a farm of $4\frac{1}{2}$ acres for the multiplication of sugarcane varieties, a co-operative society of sugarcane growers was formed during the year at Kirlampudi.

The groundnut marketing warehouses at Cuddalore, Tirukkoyilur, Vriddhachalam and Tiruvannamalai continued to function. Over 8,312 candies of groundnut kernels to the value of Rs. 2,70,884 were sold during the year as against 6,749 candies valued at Rs. 1,86,390. Two "better farming" societies were organized in Vallipuram, Chingleput taluk, and Kaliyanur, Conjeeveram taluk.

Ten Co-operative Agricultural Societies were at work in the V circle. They ran demonstration plots, seed farms and acted as agents to secure seeds and manures. The co-operative demonstration society at Kumbakonam and the Lalgudi Sivagnanam Co-operative Agricultural Society distributed 21,815 lb. of paddy seed, 26,893 lb. of green manure seed and 101,829 lb. of bone meal. The Lalgudi Society issued a loan of Rs. 15,402 on the security of 7,855 bags of paddy.

In the VI circle, 40125 lb. C. 7 Karunganni cotton, 9,772 lb. of Co. 2 Cambodia cotton seed and over 10,000 bags of paddy were sold by the Co-operative Loans and Sales Societies.

On account of the low price for pepper, substantial work could not be turned out during the year by the Co-operative Loans and Sale Societies started for the benefit of pepper growers in the VII circle. Two co-operative societies for sugarcane growers were organized in Udipi taluk and about 13,000 sugarcane setts of improved varieties were supplied to the members.

The Co-operative Societies at Rasipuram, Edapadi and Pudupatti in Salem district are doing good work in promoting the clean picking of kappas and stocking Co. 2 Cambodia cotton seed for sale. The society at Pudupatti maintains a buffalo breeding-bull. The sugarcane growers association started in Podanur was supplied with setts of the most suitable new varieties of cane and manurial plots were also laid down on members' land. One thousand two hundred and forty-two tons of cane from 33 members were sold to the sugar factory and a premium of annas 4 per ton was obtained.

A special paddy seed distribution campaign was undertaken in the famine area of Tekkali, Ganjam district, in co-operation with the Revenue Department. With the aid of Takkavi loans granted to the ryots in the area 251 cwt. of seed were distributed.

The lower Bhavani Project irrigation experiments were continued in co-operation with the Public Works Department at Chin-nasamudram and Kugalur. The Assistant Director of Agriculture, Coimbatore, who accompanied the project localization party visited 135 villages.

(2) Agricultural Associations.

One Agricultural Association and 22 village improvement associations were started in the I circle. The District Agricultural Associations of Ganjam and Vizagapatam contributed funds for the District Exhibitions held at Narasannapeta and Palakonda. A fruit show was arranged by the Fruit Growers' Association at Vizianagram. Forty-five firka Agricultural Associations, each with the Revenue Inspector as President, an enthusiastic educated ryot as Secretary and Agricultural Demonstrator as technical adviser were started in the II Circle. The District Agricultural Association of Trichinopoly conducted the Agricultural and Industrial Exhibition at Srirangam. The Tanjore Delta Mirasdars' Association at Mayavaram published a journal 'Mirasdar' and issued a weekly marketing intelligence. The District Advancement Association, South Kanara, organized an Agricultural and Industrial Exhibition at Mangalore. The Agricultural Association, Palghat, continued to maintain a premia breeding bull.

VI.—LEGISLATION.

46. *Cotton Ginning and Pressing Factories Act*.—This Act continued to be in force. Seventeen new ginning factories were installed during the year, making a total of 617 at the end of the year. The owner of one factory was prosecuted for infringement of the provisions of the Act as against five prosecutions in the previous year. The number of pressing factories rose from 67 to 70 during the year. The question of amending the Act by a suitable bill for Madras in order to prevent the mixing and watering of cotton, etc., is under consideration.

47. *Cotton Transport Act—Single licences*.—Thirty-seven licences were issued for import of waste cotton by rail into the two protected areas. In addition, nine licences were issued for import of ginned cotton into the "northerns" and "westerns" area and two licences in respect of the "southerns" area. The total number of single licences issued during the year was thus 48 as against 14 in the previous year.

Annual licences.—Fifteen licences with 247 certified copies for import of ginned cotton by rail were issued during the cotton year 1935-36 (1st February 1935 to 31st January 1936) to be used by cotton mills in the "southerns" area as against 16 licences and 285 certified copies issued in the previous year. Of these, 164 certified copies were used as against 214 in the year previous. The rest of the certified copies were returned unused. In addition to

the above, 17 licences and 189 certified copies were issued to the mills in the "southerns" area from 1st February 1936 to 31st March 1936.

Sea licences.—Fifty licences were issued during the year for the import by sea of 50,535 bales of ginned cotton into Tuticorin as against 53 licences for 45,780 bales issued in the previous year.

48. *Cotton Control Act.*—The enforcement of this Act prohibiting the cultivation and mixing of *pulichai* (*G. neglectum*) cotton and its sale was extended for another three years from 12th July 1935. The strict application of the provisions of the Act in the previous two years against the offenders had a good effect in reducing the area sown to *pulichai* cotton. Due publicity was given in time in the cotton centres warning ryots of the provisions of the Act. When stray cases of cultivation of this cotton were noticed in the Madura district, plants were eradicated by resorting to persuasion. Six offenders in the Sankarankoil taluk of the Tinnevely district who persisted in keeping the crop were recommended for prosecution.

49. *Cotton Markets Act.*—The provisions of the Madras Commercial Crops Markets Act (Act XX of 1933) in respect of cotton were enforced in the Tiruppur Municipality which was declared as a notified area from the 1st January 1936. The Market Committee consisting of 10 elected members and two members nominated by Government was constituted in January and functioned thereafter. The first meeting of the Committee was held in February 1936 and Mr. D. O. Asher, the member elected by the Tiruppur Municipality, was elected as the chairman of the Market Committee. Registration of traders, brokers, weighmen, etc., was commenced from the 30th March and the Committee enforced the Act, Rules and by-laws from the beginning of the current official year (1st April 1936). The "Holmes" Market, Tiruppur, has been rented from the Tiruppur Municipality for use as a market yard. The services of an experienced Agricultural Demonstrator were loaned to the Committee as its secretary and the necessary inspection and clerical staff was also appointed by the committee.

The levy has been paid regularly. Necessary returns from licencees and registered traders have been received promptly. The main difficulty now requiring solution is to get the ryots to make use of the facilities afforded to them and propaganda to this end is being carried out both by the committee and this department.

50. *Pest Act—The Agricultural Pests and Diseases Act III of 1919.*—This Act continued to be in force during the year in respect of the diseases and insects affecting cotton, groundnut, palmyra palm and for the eradication of water hyacinth.

Cotton.—The Act was continued to be enforced in respect of two insect pests, stem-weevil (*Pemphres affinis*) and pink boll worm (*Gelechia gossypiella*) attacking Cambodia and *pachanadan* cottons in Salem, Trichinopoly, Madura (except 10 villages which are interspersed in the Ramnad district) and Coimbatore districts.

The work of eradication of all Cambodia and *pachanadan* cotton plants by 1st September 1935 proceeded generally smoothly and with some exceptions was completed before the notified date. There were 7 defaulters in Coimbatore district, 446 in Madura district, and 1 in Trichinopoly district all of whom were prosecuted. The largest area under cotton which remained un-eradicated on the 1st September namely 2,730 acres was in the Trichinopoly district, Madura coming next with 850.55 acres followed by Coimbatore with 372.72 acres. The large area in the Trichinopoly district was mostly contributed by the Marungapuri zamin and the villages in the Kulittalai taluk bordering the Pudukkottah State. Steps are being taken by the latter to enforce a similar Act in the State. The Anamalai Non-pest Act area (Coimbatore district) was brought under the scope of the Act during the year, but owing to the late rains the kar pickings were not over by September. An extension of time to pull out the plants till 21st October was therefore granted to this area. Subsequently it was decided at a meeting presided over by the Hon'ble the Minister for Development that the necessary data in regard to this tract should be collected for a period of three years so that a permanent policy might be laid down and that during this period the crop in this tract might be eradicated by the 30th September instead of by the 1st September and that extension of time beyond this date might be granted up to two months if necessary. The data are being collected. In the Madura district, as mentioned in last year's report, 10 villages which are interspersed in the Ramnad district were excluded from the Pest Act area during the year. As a special case, the taluks of Dindigul, Nilakkottai and Melur in this district were given extension of time by three weeks to pull out the plants subject to the condition that fresh sowings should be done only after the lapse of six weeks from the last date of eradication of the old crop.

Groundnut.—The Act against the Hairy Caterpillar pest (*Am-sacta Albistriga*) on groundnut continued to be in force in the same area as in the previous year, viz., Vriddhachalam, Kallakurichi and Tirukkoyilur taluks of the South Arcot district, Tiruvannamalai and Polur taluks of the North Arcot district, and all Government, inam and zamindari villages of Andimadam, Jayakondan and Manapathur firkas of the Udayarpalaiyam taluk in the Trichinopoly district. As fresh appearance of this pest was noticed in Chidambaram and Tindivanam taluks of the South Arcot district and in nearly all taluks of the North Arcot district, they were also included in the notified areas under the Act. The working of the Act was satisfactory.

Palmyra.—The application of the Act which was enforced from March 1933 in the Palghat taluk of the Malabar district was continued during the year in this taluk as well as in the Ponnani and Walluvanad taluks, in order to control the disease of bud-rot on palmyra. The worst affected area was in the Palghat taluk. Three agricultural subordinates and one Revenue Inspector were

on pest control duty and through their efforts, 6,445 diseased trees were cut during the year. Although the spread of the disease has been greatly checked, there are a few diseased trees here and there and fresh attacks are also cropping up. The Act continues to be in force till March 1937.

Water hyacinth.—The Act was in operation in parts of South Arcot, Trichinopoly and Malabar districts and in all taluks of the Tanjore and Chingleput districts.

VII.—PUBLICATIONS.

51. The undermentioned leaflets and bulletins were published during the year 1935-36 :—

Subject.	Languages in which published.	Price.
Leaflet Series—		
Cattle breeding ..	English (Vernacular editions under print).	Free.
Breeding-bulls and their management.	Do.	Do.
Descriptive notes on improved strains from important varieties of paddy evolved at the Agricultural Research Station, Maruteru.	English (Telugu under print).	Do.
How to send specimens for examination.	English, Tamil, Telugu, Kanarese and Malayalam.	Do.
Red Hairy Caterpillar Pest.	English	Do.
No water rate or fasljasti for certain crops; concession made by Government to ryots in aid of cultivation.	English (Vernacular editions under print).	Do.
Note on Turmeric ..	English	Do.
A bund forming implement.	Tamil, Telugu, Kanarese and Malayalam (English edition published in 1934-35).	Do.
The house fly nuisance and its control.	Tamil, Telugu, Kanarese and Malayalam (Published in English in 1934-35).	Do.
A pest on stored paddy.	Do.	Do.
Cotton	Tamil, Telugu and Kanarese (Published in English in 1934-35).	Do.
Making of pouderette from night-soil.	Tamil, Telugu, Kanarese and Malayalam (Published in English in 1934-35).	Do.

Subject.	Languages in which published.	Price.
		RS. A. P.
Leaflet Series—cont.		
Tokra—Orabanche sp. A pest on tobacco.	Telugu (Published in English in 1934-35).	Free.
How to increase crop yields and maintain good health.	Telugu	Do.
Bulletins—		
Some practical hints on beekeeping.	English	1 4 0
The planting of sugarcane.	Do.	0 4 0
The economic condition of the ryots in the Vizagapatam district and how to improve it.	Do.	0 6 0
Report on the investigations on a new and simple process for the manufacture of active charcoal from paddy husk and on the manufacture of cream jaggery using active carbon.	Do.	0 10 0

52. The number of copies of the Villagers' Calendar printed in each language during 1935-36 was as follows :—

English (1935 edition)		4,500
Tamil (1935-36 edition)		18,700
Telugu		26,700
Kanarese		3,500
Malayalam		6,900
Total ..		60,300

VIII.—STATISTICS.

53. *Weekly cotton mill and press returns.*—There were 32 spinning mills during the year all of which continued to send their returns of cotton received in their mills every week. Returns from the cotton presses and the Collectors of Customs were also received every week.

54. *Enquiry into the cost of production of crops.*—This enquiry financed by the Imperial Council of Agricultural Research was continued during the year in the three districts of Vizagapatam, Bellary and Coimbatore.

IX.—EXPENDITURE.

55. The receipts and expenditure for the year 1935-36 and the corresponding figures for the previous year are given below :—

		1935-36.	1934-35.
		RS.	RS.
Expenditure		18,57,627	18,44,341
Receipts		1,91,168	1,82,436
Net expenditure		16,66,659	16,61,905

The increase in expenditure in 1935-36 is mainly due to the opening of an Oil Seeds Research station at Erayanur (Tindivanam) and the increase in receipts to the general expansion of departmental work in all circles and consequent larger sales of seeds, implements, etc., and to the collection of boarding and lodging fees amounting to Rs. 2,094 from a student from Hyderabad admitted into the Agricultural College.

X.—PROGRAMME OF WORK FOR 1936-37.

(1) *Botany*.—Testing of samples of seed, continuation of studies on the fungus *colletotrichum* sp., survey and study of bananas, and study of indigenous fodder grasses.

(2) *Chemistry*.—Analytical and advisory work to be continued as before.

Research on soils.—A study of the method of estimation of the electrical conductivity in South Indian soils, influences of irrigation on soil characteristics with special reference to black soils, factors affecting the pH of soils, a study of the origin and the Geo-chemical characteristics of the black soils of Ceded districts, the preliminary study of the problem of amelioration of alkaline soils.

Plant nutrition.—Permanent manurial experiments, old and new, influence of manuring on the mineral composition of the plantains, effect of manuring with potash on the keeping quality of plantains, effect of manuring and soil characteristics on the non-sugar organic matter of sugarcane, the stimulating effect of organic matter on crop quality, effect of manuring on the synthesis of proteins of herbage.

Animal nutrition.—Protein requirements for work, the Nitrogen partition of herbivores on different protein diets, digestibility coefficient of various combinations of fodder and concentrate.

Microbiology of soils.—Studies in Nitrogen fixation in soils, studies on *Fusarium Moliniforme* and on groundnut nodule organism.

Sugarcane and jaggery.—Studies on the arrowing of sugarcane, methods for the assessment of the maturity of sugarcane, study of the non-sugar organic matter in cane-juice, preparation and studies on active carbons, further investigations into the making of refined jaggery.

Miscellaneous.—Studies on the preservation and marketing of eggs, composition and vitamin contents of fruits, biological values of brown and white ragi.

(3) *Crops*—(a) *Millet*s.—Continuation of the survey of the rainfed cholams, studies in the inheritance of characters in sorghum, varietal studies and selection for yield, comparative trials of cumbu, ragi, korra and cholam, trial of fresh African cumbu varieties, evolution of a short duration economic strain of ragi, study of pollination mechanism and hybridization technique.

(b) *Paddy*.—Economic work by selection and hybridization, cultural, manurial, seasonal and irrigation experiments, fundamental studies in Genetics, Cytology, Physiology and Histology and analysis of market samples.

(c) *Cotton*.—Studies on the improvement of yield with regard to irrigated cottons and rainfed cottons, improvement of quality, reduction in the cost of cultivation, and study of inheritance of characters.

(d) *Oil seeds*.—Comparative yield trials of groundnut varieties, selection and isolation of pure lines, studies of the progenies of the crosses, hybridization for evolving new types and for inheritance studies, determination of oil content and shelling percentage comparative trials of castors and gingelly, studies of the progenies of crosses and determination of oil content, manurial experiments on coconuts, effect of manures on the size of the nut and its copra content, developmental studies on the seedlings obtained from crosses, selfed and naturally pollinated nuts. Investigation into the causes of button shedding.

(e) *Pulses*.—Varietal and inheritance studies in lablab and cowpea, trial of redgram single plants in replicated rows and study of its inheritance of pod and grain size and of seed colour. Comparison of the several cultures of bengalgram isolated for yield in replicated rows, study of its inheritance of wilt resistance, colour and size of seed and multiplication of the existing strains.

(f) *Fruits*.—Continuation of the budding and grafting experiments, particular attention being paid to the propagation of East Mallig Apple Stock. Budding of citrus by the method employed for Para rubber, experimental grafting of the true Mangosteen on to various other species, propagation of the Litchi and Avocado, raising of new varieties of strawberries, seed selection of the Cape gooseberry and tomato, trial of medicinal plants and testing of Russian varieties of lupins for their dietetic value.

Sugarcane.—Work on the increase in the yield of sugarcane by varietal tests, manurial trials and cultural methods, studies on

the reduction of cost of production by manurial trials, irrigation trials, trials of other cultural operations and prolongation of cane crushing period, improvements in the manufacture of end products by selection of mills, improvement in the colour and keeping quality of jaggery and trial of sugar manufactured by open pan system.

(4) *Entomology*.—Study of pests on paddy, coconut, cotton, sugarcane, fruit trees, vegetables and stored products, insecticidal trials, systematic work on parasites and predators of crop pests and research work on bee-keeping on various aspects.

(5) *Implements*.—Experimentation with groundnut decorticators, experiments with oven drying of grain, further trials of tractor subsoiling, continuation of trials of oil engines on agricultural research stations, continuation of trials of light ridging ploughs, experimentation with light rotary hoe for bullock draught and trial of Howard Rotary Tillage tractor, continuation of wind-mill pumping records, continuation of canemill trials, further trials of water lifts and development of improved designs, continuation of trials of rubber-tyred carts including development of improved designs, trials of paddy husking machines experiments with improved designs of winnowers, further trials of seed drills and development of improved designs, trials of oil milling machines, further trials of improved polishing machines for turmeric, trials of improved guntakas for groundnut lifting, trials of new light steel ploughs including bar point ploughs, trials of large size bund forming implements, development of cholam polishing machine, experiments with hand extraction of palmyra and other fibre, design and construction of manure spreader for rubber-tyred cart, trial of Burmese wet land puddling implements and experiments with new designs, trial and development of bullock-drawn cultivators, experiments with cotton seed crushers, tests of country made ropes, trials of improved bullock yokes.

Irrigation.—Study of water requirements of paddy, sugarcane and plantain at the Agricultural Research station, Samalkota, paddy irrigation experiments at Nandyal, irrigation experiments with 'V' notch at Agricultural Research Station, Palur, on the quantity required for raising sugarcane and paddy.

(6) *Livestock—Kangayam breed*.—Work in building up a herd of pure cattle will be continued. Attempts will be made to improve the milk yield of this breed without impairing the draught qualities of the bulls.

Sind breed.—Building up a herd of good milking cows.

Hallikar breed.—Building up a good herd of cattle by selection.

Sheep breeding.—Efforts to evolve a pure white strain of Bel-lary sheep.

Poultry.—Improvement of poultry by maintaining imported and country breeds.

(7) *Mycology*.—Investigation of *piricularia* and foot-rot in paddy, study of mosaic disease in sugarcane experiments on *Fusarium* wilt on plantains, yellow disease of cholam, *Rhizoctonia* diseases, field experiments on *Phytophthora Nicotanae*, and study of soil fungi and indigenous fungicides and fumigants.

Agricultural Research Stations.

Anakapalle—Sugarcane.—Study and comparison of varieties, manurial trials, trials to determine spacing in relation to varieties, sources of irrigation and methods of planting, trial of varieties in garden, wet and dry lands, trial of seedlings, ratooning of sugarcane, seed-rate and study of lodging in cane.

Paddy.—Manurial experiment maintenance of purity of strains and comparison of the promising ones.

Ragi.—Maintenance of purity of the strains of early, dry and summer ragis and comparison of the promising varieties.

Other crops.—Trials of Cambodia cotton, castor, gingelly, soya beans, gogus and grams, chillies and tobacco.

Apiculture.—Domestication of bee colonies.

Poultry.—Grading of local birds with improved varieties.

Samalkota—Sugarcane.—Study of several varieties of seedling canes, manurial experiments to find out the nitrogen requirements, comparison of intensely manured against unmanured seed material, cultural studies and study of tillering and growth in height of sugarcane.

Paddy.—Selection work in main, intermediate and second crop paddy, trial of pure lines and varieties and study of manurial requirements.

Plantain.—Study of varieties under "Seethacattu" and "Tholakari" plantings, study of manurial requirements to note the effect of potash on the keeping quality of fruits, preparation of plantain figs and hybridization work.

Other crops.—Selection work on pulses and chillies, growing of garden crops like Cambodia cotton, ragi, wheat, linseed, soya bean and bengalgram.

Side lines.—Poultry, Apiculture and Sericulture.

Guntur.—Continuation of the work done on cotton, chillies, tobacco, gogu, jonna, sajja, maize, variga, korra and groundnut.

Other crops.—Trial of bengalgram, coriander, soya beans, teosinte, redgram, lucerne and medicinal plants.

Side lines.—Poultry-keeping, bee-keeping and fish culture.

Hagari.—Trial of both exotic and local varieties compared with H.1 cotton. Comparison of Bombay jonna varieties with local selections, selection work in korra, ragi, safflower, bengalgram and sajja.

Side lines.—Apiculture and fruit cultivation.

Nandyal.—Selection work in cotton to improve N. 14, comparative trials with H. 1 cotton, improvement in jonna and selection work in korra. Rotational trial, introduction of groundnuts, soya beans, bengalgram, redgram in rotation and as mixtures with cotton.

Side lines.—Intensive farming, vegetable cultivation and cattle-rearing.

Palur—Sugarcane.—Varietal trials, selection of promising thick and thin cane and their propagation for further study, study of yielding capacity, the economies, ripening period and suitable ratoons, multiplication of setts by short crop method, determination of optimum spacing.

Paddy.—Selection work, strip trials of Sinna samba, Jeevan samba, trial of Vadan samba, comparative trials of samba varieties, kar paddy trial and bone-meal optimum dose experiment.

Other crops.—Growing of citrus, sweet flag and selection work in local ragi, cumbu, tenai and varagu, multiplication of groundnuts.

Side lines.—Poultry, pisciculture and apiculture, preparation of activated carbon and manufacture of cream jaggery and white sugar.

Aduturai.—Distribution of bulk seeds of 12 strains, district trials of Kuruva and samba, comparative trials, manurial trials on the effect of age of seedlings in nursery on yield, effect of various doses of bone-meal on different rates of dressing of leaf, molasses, as manure for paddy.

Other crops.—Trial of a few promising thick canes of Coimbatore, soya bean and cotton, growing of turmeric in wet lands and possibility of taking crops of groundnut, maize, cholam, in single crop wet lands before the planting of paddy and trial of plantains, growing Indian and English vegetables and pine-apples in dry lands.

Side lines.—Pisciculture, Poultry farming and apiculture.

Pattukkottai.—Trial of Coimbatore paddy strains and Aduturai strains of Adt. 8 and Adt. 2, chewing canes and Coimbatore Vellai and Poovan canes, cowpea as a green manure, groundnut varieties A.H. 25, A.H. 32 and A.H. 45, Gudiyattam bunch variety, Cambodia cotton.

Side lines.—Poultry and maintenance of breeding bulls.

Koilpatti.—Work on the evolution of better strains of karunganni by selection and purification, trial of Cambodia, selection

work on Periya manjal cholam, comparative trials of summer cholam strains, single plant selection and purification studies of Irungu cholam, trial of cumbu, ragi and Italian millet.

Other crops.—Trial of Pusa types of green gram and selections of black gram, trial of coriander selections and thrip resisting varieties of chillies.

Taliparamba.—Varietal trials of paddy, sugarcane, plantains, ginger, chilly, ragi and arecanut, study of pine-apple, mango, cashew, sapota and other fruit plants, study of manurial requirements of pepper.

Side lines.—Bee-keeping, poultry breeding and maintenance of a small buffalo breed.

Nanjanad.—Breeding and selection of potatoes, study of botanical characters, identification and classification, row yield trials of new varieties, comparative trials of promising varieties, introduction of new varieties by selfing and hybridization, trials with potato fertilizer, mixtures of different firms, phosphatic manurial experiments, compost experiments, size and spacing experiments, age of seed experiment, keeping quality experiment and scab experiments, continuance of mass selections in koral and samai, green manuring experiments on samai, concentrated manures on samai, topping versus non-topping of samai.

Other crops.—Trial of ragi, groundnut, bengalgram, oats, wheat and barley, trial of fodder crops like clover, lucerne, maize and soya beans.

Side lines.—Liming demonstration, goat and sheep breeding.

Trial Plots.

First Circle.—Trial of new strains of paddy, sugarcane, POJ. 2878, Co. 419 and Co. 421, improved strains of ragi No. 528 and No. 355, bunch groundnut and A.H. 25 and Bombay and Punjab ganti varieties of jonna.

Second Circle.—Trial of paddy strains of Atragada, Venkasanam, Konamani, AEB. 65 and Adt. 11 and Garikasannavari, cotton strain No. 171.

Third Circle.—Trial of new strains and exotic varieties compared with approved local strains.

Fourth Circle.—Trial of groundnut A.H. 45, ragi E.C. 1507, sugarcane Co. 419 and Co. 421 and cholam T. 12 and A.S. 2069.

Fifth Circle.—Trial of Coimbatore and Aduturai paddy strains and local unselected paddy seeds, millet strains like cumbu, ragi and cholam against local variety, sugarcane varieties such as Co. 411, 413, 417, 419, etc. Bellary onion and Davanam onions versus local onions, periyamanjal cholam versus local irungu cholam, Cambodia, karunganni and uppam cotton, A.H. 25 and A.H. 45 groundnuts, paddy strains of AEB. 65 and Adt. 11 and ragi strain E.C. 593.

Sixth Circle.—Trials of rainfed and irrigated cholam strains, ragi E.C. 593, Punjab cumbu and tenai and new strains under cotton and paddy.

Seventh Circle.—Trial of local strains of paddy produced at the Pattambi Paddy Breeding station, sugarcane new varieties as J. 247, M. 55, Co. 213, Co. 412 and 404.

Eighth Circle.—Trial of suitable paddy strains, ragi E.C. 593 against local in more centres, cholam A.S. 1575, new strains of cotton, groundnut A.H. 25, sugarcane thick varieties, potatoes, linseed, bengalgram and wheat.

Demonstration.

(1) *Crops.*—Strains of paddy, ragi, sorghum, cotton, improved varieties of groundnut, varieties of sugarcane, intercultivation to cotton, spacing experiments, advocating reduced seed-rate and economic planting, advice on the importance of roguing and clean cultivation.

(2) *Implements.*—Spreading the use of improved ploughs, guntakas, mhote wheels, Persian wheels and sprayers, use of better cane mills and demonstration of cream jaggery manufacture, advocating use of pumps and engines and waterlifts for lifting water.

(3) *Manures.*—Proper preservation of cattle manure, utilization of organic waste material by composts, the use of municipal rubbish and night-soil, extension of growing green manure crops, use of oil-cakes, fish manure and bone meal.

(4) *Seed supply.*—Introduction and extension of improved varieties of various crops suitable to each locality.

(5) *Livestock.*—Stationing more breeding bulls and supplying milk breeds in suitable localities, encouraging ryots to grow fodder crops, distribution of good breeds of birds, and propaganda about proper feeding of cattle.

(6) *Jaggery manufacture.*—Preparation of activated carbon, manufacture of cream jaggery and white sugar with the centrifugal machine.

(7) *Insect Pests and Diseases.*—Demonstration of remedial measures against betel-vine wilt, tobacco stem rot, yam disease, citrus disease, campaign against cholam smut.

(8) Concentrated work in all central villages.

(9) Exhibitions on festive occasions, tour of motor exhibition vans, lantern lectures.

(10) Starting of firka agricultural associations.

I have the honour to be,

Sir,

Your most obedient servant,

D. ANANDA RAO,
Director of Agriculture

GLOSSARY.

Apple	<i>Pyrus malus.</i>
Arecanut	<i>Areca catichu.</i>
Avaram bark	<i>Acacia decurrens.</i>
Avocado	<i>Persia gratissima.</i>
Barley	<i>Hordeum vulgare.</i>
Bengalgram	<i>Cicer arictinum.</i>
Betel-vine	<i>Piper betel.</i>
Castor	<i>Ricinus communis.</i>
Cashewnut	<i>Anacardium occidentale.</i>
Cholam	<i>Sorghum vulgare.</i>
Coffee	<i>Coffea arabica.</i>
Cotton	<i>Gossypium.</i>
(i) Cambodia cotton	<i>Gossypium hirsutum.</i>
(ii) Karunganni cotton	<i>Gossypium indicum.</i>
(iii) Uppam cotton	<i>Gossypium herbaceum.</i>
(iv) Pulichai cotton	<i>Gossypium neglectum.</i>
(v) Westerns cotton	} Mixture of <i>Gossypium herbaceum</i> and <i>indicum.</i>
(vi) Northern cotton	
Chillies	<i>Caspiscum sp.</i>
Coconut	<i>Cocos-nucifera.</i>
Cowpea	<i>Vigna catiang.</i>
Cumbu	<i>Pennisetum typhoideum.</i>
Dhaincha	<i>Sesbania aculeata.</i>
Fox glove	<i>Digitalis purpurea.</i>
Gingelly	<i>Sesamum indicum.</i>
Groundnut	<i>Arachis hypogaea.</i>
Grape-vine	<i>Citrus decumana.</i>
Guinea grass	<i>Panicum maximum.</i>
Horsegram	<i>Dolichos biflorus.</i>
Jalap	<i>Ipomea purga.</i>
Kaki weed	<i>Alternanthera echinata.</i>
Kolinji	<i>Tephrosia purpurea.</i>
Kolukattai grass	<i>Pennisetum cenchroides.</i>
Korai	<i>Cyperus rotundus.</i>
Korra	<i>Setaria italica.</i>
Lucerne	<i>Medicago sativa.</i>
Loquat	<i>Eriobotrya japonica.</i>
Maize	<i>Zea mays.</i>
Mangoes	<i>Mangifera indica.</i>
Mangosteen	<i>Garcinia mangostona.</i>
Manilla hemp. •	<i>Musa Tixtils.</i>
Onion	<i>Allium sativum.</i>
Orange	<i>Citrus aurantium.</i>
Paddy	<i>Oryza sativa.</i>
Palmyra	<i>Borassus flabellifer.</i>
Pani varagu	<i>Panicum miliaceum.</i>

Papaya	<i>Carica papaya.</i>
Pepper	<i>Piper nigrum.</i>
Peach	<i>Persica vulgaris.</i>
Peas	<i>Pyrus communis.</i>
Pillipesara	<i>Phaseolus trilobus, Aii</i>
Pineapple	<i>Ananas sativa.</i>
Plantains	<i>Musa sapientum.</i>
Plum	<i>Prunus salicina.</i>
Potato	<i>Solanum tuberosum.</i>
Ragi	<i>Eleusine coracana.</i>
Rambutan	<i>Nephelium lappaceum.</i>
Redgram	<i>Cajanus indicus.</i>
Samai	<i>Panicum miliare.</i>
Sapota	<i>Achras sapota.</i>
Soya bean	<i>Glycine soja.</i>
Sugarcane	<i>Saccharum officinarum.</i>
Sunnhemp	<i>Crotolaria juncea.</i>
Sweet flag	<i>Acorus calamus.</i>
Tapioca	<i>Manihot utilissima.</i>
Teosinte	<i>Euchlœna mexicana—schrœd.</i>
Tenai	<i>Setaria Italica.</i>
Tobacco	<i>Nicotiana tobacum.</i>
Tung	<i>Aleurities fordii.</i>
Turmeric	<i>Curcuma longa.</i>
Varagu	<i>Paspalam scrobiculatum</i>
Variga	<i>Panicum miliaceum.</i>
Wheat	<i>Triticum spp.</i>
Yerba Mate (Paraguay tea)	<i>Ilex paraguayensis.</i>

Government of Madras

DEVELOPMENT DEPARTMENT

G.O. No. 1691, 29th September 1936

Agriculture—Administration Report for 1935-36—Recorded with remarks.

READ—the following paper :—

From the Director of Agriculture, dated 10th August 1936,
No. D. 68/36.

Order—No. 1691, Development, dated 29th September 1936.

Recorded.

2. The Agricultural College continued to maintain its high level of efficiency. Unemployment among agricultural graduates was probably the cause of the fall in the strength of the college in the previous year. There was an improvement in the year under review though the final strength of the first-year class still fell short by 4. The Government trust that the fairly large increase in the staff of demonstrators they recently sanctioned will help to relieve the problem of unemployment to a certain extent. It was recognized that people who want to take to practical agriculture do not require the high standard of instruction provided at the college both in the theory and the practice of the science of agriculture and it was to provide for the adequate instruction of such young men that a class in Farm Management of nine months' duration was started in the college in the year 1933 and facilities provided for the students joining the class to acquire a working knowledge of malt-making, bee-keeping, jaggery-making and other subsidiary occupations. The experiment was a success at Coimbatore and similar classes have now been started at Nandyal in Kurnool district and Taliparamba in Malabar district after the close of the year. In order that the benefits of education in practical agriculture may reach a yet wider area, the Government have recently instituted a system of training under which nearly 150 young men will shortly be given instruction in practical farming at one or the other of the agricultural stations in the Presidency. It is hoped that these young men will go back to their own land after the training and put to practical test the knowledge and experience they acquire at the agricultural stations.

3. The Director's report gives a full account of the many and varied items of agricultural research work done during the year. A large number of botanical specimens were identified and an equally large number, received mostly from Kew, added to the Herbarium. The survey of plantains was continued. The soil survey of the Tungabhadra project was completed and a similar survey was also made of the Willingdon Reservoir with a view to find out the cause of alkalinity which has developed in that area. The latter survey showed that the soil did not contain injurious salts to any marked degree and that the alkalinity was probably the result of insufficient drainage. Experiments in animal nutrition continued while modifications were made in the manufacture of activated carbon with a view to increasing its efficiency and reducing its cost and fresh experiments were made with other waste products for the manufacture of activated carbon.

4. The study of millets was continued. At the millets station, 1,460 units of sorghum, 800 units of ragi and 400 units of korra were studied. The research work in paddy continued on the accepted lines of selection, hybridization and introduction. Two new strains of paddy are reported to be ready for release for distribution. One is suitable for resistance to *piricularia*, while the other a cross progeny from Co3, is said to be the first hybrid strain produced on the paddy station at Coimbatore. From the station at Pattambi four new strains from important varieties are being released this year. In view of the importance of this crop, two new stations are being opened in the current year in Tinnevely and Nellore. Cultural experiments which aim at increasing the yield of paddy and decreasing the cost of cultivation were continued at different places and have shown remarkable results. Experiments in cotton cultivation and on different varieties of fodder were continued with useful results. A new oil seeds station was opened at Erayanur in South Arcot. It offers scope for carrying out research on all the different oil seed crops important to this Presidency and several experiments in groundnut, castor and gingelly are in progress. Potatoes, chillies, tobacco and sugarcane are also receiving attention.

5. Several schemes undertaken by the department with the financial aid from the Imperial Council of Agricultural Research or the Indian Central Cotton Committee are also in progress. The Rice Research scheme at Berhampur, which continues to be under the control of the Madras Agricultural Department is expected to be completed by March next and it is hoped that the station will be able to select one or two of the best strains of paddy and make them available for district trials and later on for distribution in the tract. The main objects of research on potato at Nanjanad on the Nilgiris is to evolve new superior varieties and much progress has already been made in this direction. The research on sugarcane is carried on at Anakapalle and at the new sub-station at Gudiyattam. The work at Anakapalle is directed

towards the improvement of the sugarcane crop in all its aspects and reduction in the cost of production to the minimum. The sub-station at Gudiyattam was started only in 1935. The Dry Farming scheme at Hagari has, for its object, the selection and evolution of economic drought resistant strains. Experimental work on the physical properties of the soil of the tract and the movement of moisture is also in progress under the control of the Soil Physicist whose headquarters have been shifted to Hagari for this purpose. Work on Fruit Research was started during the year at Anantarajupet in Cuddapah district and is in progress. Experiments in animal nutrition already referred to and the preparation of malt from cholum, both of which are in progress at Coimbatore are also financed by the Imperial Council of Agricultural Research.

The Imperial Council of Agricultural Research has also sanctioned a scheme prepared by the University of Madras for research work on morphology and anatomy of sugarcane—sorghum hybrids—and it is hoped that funds will soon be provided for the scheme so that work may commence in October 1936.

6. Certain hybridization work in cotton has been in progress with the help of the Indian Central Cotton Committee. The Madras Herbaceum scheme is purely a hybridization scheme started with a view to evolving new strains of cotton. The Pempheres and Physiological scheme is concerned with the investigation of the causes for the variations among certain strains in the degree of attack of stem weevil, of breeding strains immune to its attack and of the factors responsible for the shedding of buds and bolls of cotton. The studies conducted under the Madras Fodder Cholum scheme are for determining the causes for the harmful effects of fodder sorghum on cotton. The Nadam Breeding scheme has the object of evolving annual types suited to the soils where the perennial Nadam cotton is grown now so as to minimize the ravages of pests.

7. The Agricultural Engineering section has been endeavouring to evolve improved implements used by the cultivators. Light ridge ploughs were successfully tried in the districts and a cheap turmeric polisher has been constructed and tested in the Coimbatore district. Experiments are in progress for making a grain polisher which will also be effective in the de-fibration of cotton seed.

8. The department continued to conduct demonstration of improvements in crop, manuring and other cultural operations. The trial plots conducted with various crops gave very satisfactory results. There is definite indication that the adoption of the new strains evolved of the different crops leads to increased yields over local varieties. It is satisfactory to note that the number of demonstration plots has been progressively on the increase and that there was a phenomenal increase in their number from 3,170

in 1934-35 to 7,214 in 1935-36. The scheme of employing demonstration maistries on an extended scale in certain taluks of Vizagapatam district to carry out and continue the demonstration and propaganda work initiated by the demonstrator has given encouraging results. The maistries have been able to maintain an intimate contact with the ryots and the ryots have been appreciating their services and taking advantage of their presence in their midst.

The following statement shows the quantity of improved strains of seed of some of the important crops distributed by the department:—

Crops.	Total quantity.	Total area (including natural spread).
1. Cotton ..	1,580,372 lb.	615,594 acres.
2. Groundnut ..	11,171 „	..
3. Paddy ..	2,479 tons.	1,277,588 acres.
4. Sugarcane ..	1,241,296 setts.	39,597 „

The Co-operative Loan and Sale Societies also continued to be helpful in the distribution of improved strains of various kinds of seeds and bringing other agricultural improvements within the reach of the ryots and in marketing their agricultural produce.

9. Since the close of the year, as already remarked above, the Government have sanctioned an increase in the staff of demonstrators. As many as 40 additional demonstrators have been sanctioned in order that every taluk in the Presidency may have a demonstrator whose special mission it will be to educate the ryot in improved methods of agriculture. Sanction has also been accorded for the employment during the current year of 65 additional maistries so that there may be maistri for each taluk to continue the demonstration of what the demonstrators have shown to the ryots and to carry on an intensive propaganda after the departure of the demonstrator from each place. The proposal to open paddy breeding stations in Nellore and Tinnevely has been already referred to. Other schemes sanctioned recently are the printing of agricultural exhibition posters and the provision of other minor equipment for demonstration purposes, acquisition of additional land for the extension of the Guntur station, the opening of a meteorological observatory at the Central Farm, Coimbatore, and the conduct of experiments regarding environmental conditions for plant growth at the same place.

10. The provisions of the Madras Commercial Crops Markets Act, 1933, were enforced in the Tiruppur area in respect of cotton from 1st January 1936. The Government trust that the facilities afforded by this Act will be appreciated by the ryots and will benefit the cotton trade in the area and hope that when sufficient experience has been gained of the working of the Act it will be possible to extend its operation to other cotton producing tracts and also to other crops in due course.

11. A marketing staff has been working in the Province from February 1935. In accordance with a programme formulated by the Imperial Council of Agricultural Research it has completed surveys in respect of rice, wheat, linseed, tobacco, groundnut and eggs. Survey of other crops is in progress. Pending completion of the surveys, no development work is possible as the staff employed on the work cannot be diverted from the main purpose for which they are employed. The question whether additional staff should be sanctioned for development work is now engaging the attention of Government.

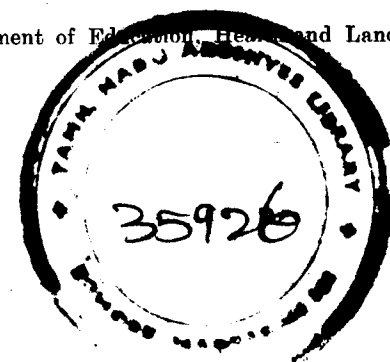
12. As a result of the appeal made by His Excellency the Viceroy for the improvement of cattle in the country, increased interest is being evinced all over the Presidency in the subject and the department has various schemes of cattle improvement on hand such as increase of stud bulls and of superior milch breeds of cattle and the opening of new cattle farms. The permanent Deputy Director (Livestock) will shortly enter on a special duty to select sites for new cattle farms. The district boards have been circularized on the desirability of their devoting attention to the subject of cattle breeding. The development of cattle breeding and a growing interest in and appreciation of the need for maintenance of properly bred animals will largely tend to the diminution of spare time now said to be available to the agriculturists. Other subsidiary occupations which will fit in with the agricultural industry are poultry-breeding, bee-keeping, sheep-breeding, fruit-growing, preparation of silage, etc. The department has succeeded in creating interest in these matters and the useful work it has begun will be continued and its advice and assistance made available to an increasing circle of agriculturists.

(By order of the Government, Ministry of Public Works)

C. J. PAUL,
Secretary to Government.

To the Director of Agriculture.
" Director of Veterinary Services.
" Registrar of Co-operative Societies.
" Education and Public Health Department.
" Public Works Department.
" Public Department.
" Finance Department.
" Accountant-General.
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