

REPORT ON THE OPERATIONS OF THE DEPARTMENT OF AGRICULTURE

MADRAS PRESIDENCY

FOR THE YEAR

1933-34



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OFFICE OF THE DIRECTOR OF AGRICULTURE,
Madras, dated the 27th July 1934.

From

S. V. RAMAMURTI, Esq., I.C.S.,

Director of Agriculture,

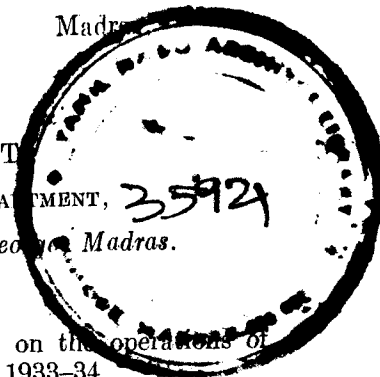
Madras

To

THE SECRETARY TO GOVERNMENT

DEVELOPMENT DEPARTMENT,

Fort St. George, Madras.



SIR,

I have the honour to submit the report on the operations of the Department of Agriculture for the year 1933-34.

I.—ADMINISTRATION.

2. I continued to be in charge of the department throughout the year except for the last three months when I was on leave outside India. M.R.Ry. Rao Bahadur D. Ananda Rao Garu officiated as Director of Agriculture during my absence on leave.

3. *Indian Agricultural Service.*—M.R.Ry. Rao Bahadur C. Tadulingam Mudaliyar Avargal, continued as Principal till 23rd October 1933, when he retired from service. He handed over charge to M.R.Ry. S. Sundararaman Avargal, M.R.Ry. Rao Bahadur D. Ananda Rao Garu was appointed as the permanent Principal of the Agricultural College and Mr. R. C. Broadfoot as the Headquarters Deputy Director of Agriculture. M.R.Ry. S. Sundararaman continued to hold the full additional charge of the post of Principal till 15th January 1934. Consequent on Mr. Ananda Rao's officiating in my place during the period of my leave, Mr. R. C. Broadfoot was appointed Officiating Principal. He took over charge on the 16th January 1934 and continued to officiate as Principal during the remaining period of the year.

The post of Soil Physicist in the Indian Agricultural Service nominally held by M.R.Ry. Rao Bahadur T. S. Venkataraman Avargal, was abolished, and his lien transferred to the permanent

post of Deputy Director in the Indian Agricultural Service that fell vacant consequent on Mr. Ananda Rao's appointment as the permanent Principal of the Agricultural College. Rao Bahadur T. S. Venkataraman continued as Government Sugarcane Expert under the Government of India.

4. *Madras Agricultural Service*.—During the absence of Mr. Broadfoot as Officiating Principal, M.R.Ry. K. Gopalakrishnaraju Garu, Deputy Director of Agriculture, II Circle, was appointed as Headquarters, Deputy Director of Agriculture. Messrs. K. Unnikrishna Menon and T. Budhavidheya Rao Nayudu were appointed as Assistant Directors of Agriculture in charge of the VI and II Circles respectively. The loan of the services of M.R.Ry. Rao Sahib Y. Ramachandra Rao Avargal, to the Government of India as Locust Entomologist, was continued for a further period of one year till 31st March 1935. There was no increase in the permanent cadre of the Madras Agricultural Service. The following are the temporary posts sanctioned during the year:—

- (1) Superintendent, Agricultural Research Station, Nanjanad;
- (2) Assistant Director of Agriculture to assist the Deputy Director of Agriculture, VIII Circle, for work connected with the Lower Bhavani Project;
- (3) Special Officer for the study of rice trade;
- (4) Superintendent, Dry Farming Scheme, Hagari.

The following officers were confirmed in the Madras Agricultural Service:—

- (1) M.R.Ry. C. V. Seshachariar;
- (2) M.R.Ry. K. Raghava Acharya;
- (3) M.R.Ry. M. Kanti Raj.

Dr. T. R. Seshadri resigned the appointment of Soil Physicist in the middle of the year. Pending the appointment of a substitute, M.R.Ry. Rao Bahadur B. Viswanath held the full additional charge of the post. The post of Soil Physicist has since been sanctioned as a temporary addition to the cadre of the Madras Agricultural Service.

Special posts.—Dr. J. S. Patel, Oil Seed Specialist, was in charge of the section till August 1933, when he was on foreign service as Coconut Enquiry Officer under the Imperial Council of Agricultural Research. During his absence, M.R.Ry. K. W. Chakrapani Marar Avargal, Farm Manager, Kasaragod, held the full additional charge of the post of Oil Seed Specialist.

The five-year contract under which M.R.Ry. T. Murari Avargal, was recruited as Superintendent, Livestock Research Station, Hosur, expired on 21st January 1934. He continued as Superintendent in the Madras Agricultural Service for a further period of one year.

Mr. N. G. Charley, who was recruited on a short-term contract as Research Engineer, proceeded on leave from 7th June 1933, preparatory to the termination of the contract, handing over charge to M.R.Ry. B. M. Lakshmipathi Mudaliyar Avargal, Mr. N. G. Charley has been reappointed as Research Engineer for a further term of five years and has since assumed charge.

5. *Madras Agricultural Subordinate Service*.—There was no permanent increase in the cadre of the Madras Agricultural Subordinate Service during the year.

Twenty-three posts of upper subordinates were sanctioned during the year as temporary additions to the cadre of the Department for the schemes financed by the Indian Central Cotton Committee and the Imperial Council of Agricultural Research. These include posts already in existence for which sanction for continuance in 1933-34 was obtained.

(1) Madras Pempheres and Physiological Scheme	...	...	...	3
(2) Fodder Cholan Scheme	...	...	...	2
(3) Rice Research Station, Ganjam	...	...	...	3
(4) Nadam Cotton Scheme	...	...	...	1
(5) Sugarcane Station, Anakapalle	...	...	...	2
(6) Co. 2 Scheme	...	...	...	3
(7) H. 1 Scheme	...	...	...	2
(8) Economic Enquiry	...	...	...	3
(9) Dry Farming Scheme, Hagari	...	...	...	4

Total 23

Besides the above, two posts of Upper Subordinates for the lower Bhavani Scheme, one post of Assistant to the Soil Physicist and one post of Demonstrator for the Co. 2 Scheme, paid from the Provincial revenues, were also sanctioned during the year.

II.—AGRICULTURAL EDUCATION.

6. The activities of the department in regard to Agricultural Education continued as in the previous year.

7. *Agricultural College, Coimbatore*.—During the year 139 applications were received for admission into the Agricultural College as against 180 in the previous year and 321 in the year before last; only 93 appeared for interview before the Selection Committee of whom 48 were selected and 25 were placed in the waiting list. The selection was made by a Committee consisting of the Director of Agriculture, the Principal and three non-official non-members, viz., (1) M.R.Ry. Diwan Bahadur T. Raghaviah Garu, C.I.E., (2) M.R.Ry. N. Sivraj Avargal, B.A., B.L., M.L.C., and (3) Khan Bahadur Yahya Ali Bahadur, Public Prosecutor, Nellore, who were appointed as Committee members for a period of three years from June 1933.

Some of the selected candidates did not join the college and men were taken from the waiting list. The final strength of the class was 40 of whom one student resigned at the end of the second term. Four failed candidates of last year also joined the College this year.

Three students applied from the agency tracts of whom one did not possess the necessary qualifications and the other two were not selected by the Committee.

Examinations.—Under the old regulations, 46 appeared for the examination in Part I and 37 passed, excluding four who passed in one subject only. In Part II, 51 appeared and 48 passed including one private student.

Under the new regulations, 44 appeared for the first examination and 32 passed.

Scholarships.—On the recommendation of the Selection Committee, of the five scholarships, one was given to the only Muhammadan available and the other four were awarded to students of Depressed classes and backward communities. Five of the existing scholarship-holders failed to get promotion and forfeited the scholarships. Four of these scholarships were reallocated to other students under Government Orders.

Tours.—Classes II and III were taken on tours to the northern and the southern districts respectively.

8. *Agricultural Middle School.*—The school at Kalahasti could not be started this year also, as the scheme under contemplation in the Education Department has not yet been sanctioned. The school at Usilampatti continued to be under the management of the District Board, Madura. There were 39 students of whom 19 were Kallars and 20 non-Kallars. The Vocational Middle School at Muthanandal, which is maintained by the Ramnad District Board, imparts agricultural education to students. The number of students on the roll was 60 during the year.

9. *Farm Labourers' School.*—The three schools at Anakapalle, Palur and Coimbatore were continued during the year. At Anakapalle, there were 28 boys on the rolls during the year as against 32 in the previous year. There were 21 adult labourers in the night school. At Palur, there were 27 on the rolls including two girls as against 23 of last year, and there were 17 adults in the night school. The school at Coimbatore was reorganized and children of farm labourers were admitted. There were nine boys in the school with wages and 28 boys without wages.

10. *Short course in Practical Agriculture.*—Short courses on ten subjects were sanctioned by Government to be instituted at the Agricultural College, Coimbatore, to meet the needs of young men who could not undergo the University courses in Agriculture. Owing to the lack of accommodation, only one course on "Farm

Management" was given from the middle of July 1933 to March 1934. Fourteen were selected for the course of whom three resigned.

11. *A course of study in co-operation.*—Government, in G.O. Ms. No. 250, Development, dated 23rd February 1934, sanctioned the institution from the academic year 1934-35 of a course of instruction in Co-operation, Auditing, Book-keeping and Banking at the Agricultural College, Coimbatore, similar to that given in the Co-operative training institutes so as to enable the students of the College to pass the Government Technical Examinations in the above subjects and to qualify themselves for appointment as Inspectors in the Co-operative Department.

12. *Dairy.*—At the beginning of the year there were on an average 34.6 cows in the herd of which 22.5 were in milk and 12.1 dry as against 33.6 and 24.4 and 9.2 respectively in the previous year (1932-33). The reduced percentage of cows in milk and increased percentage of dry cows in the year were not due to any abnormal circumstances but arose from the transfer of fewer milch cows from Hosur and the non-transfer of dry cows to Hosur.

The total quantity of milk recorded during the year was 113,163 lb. as against 140,114 lb. in 1932-33. The daily average yield of milk per cow was 13.8 lb. as against 15.65 lb. in the previous year. This reduction in total yield was due to fewer transfers of cows from Hosur and to the presence of fewer F-1 and F-2 generation cows of the cross-bred herd.

Out of the total yield of 113,163 lb. of milk during the year, only 102,007 lb. were available for sale. Of this quantity, 27,857 lb. were sold to the Agricultural College estate residents and 45,833 lb. to the College Hostel—making a total sale of 73,690 lb. The quantity fed to calves and colostrum amounted to 9,913 lb. and 1,243 lb. respectively. Now that Government have agreed to the maintenance of 35 cows at the College the sale of milk to the estate residents is assured.

The quantity of milk separated was 28,493 lb. as against 44,968 lb. in 1932-33 and it yielded 2,819 lb. of cream. Of this cream 2,789 lb. were churned and the butter produced was 1,565 lb. of which 1,212 lb. were sold as butter and 348 lb. converted into ghee.

The average cost of production per pound of milk during the milking period of cows was 5.45 pies calculated on the gross yield of 113,163 lb. of milk and 6.05 pies calculated on the net yield of 102,007 lb.

The receipts during the year amounted to Rs. 11,354 as against Rs. 12,609 and the expenditure was Rs. 18,654 as against Rs. 21,774 in the previous year. A net loss of Rs. 7,341 has resulted as against Rs. 9,195 in the previous year.

13. *Conference*.—The Twenty-second College Day and Conference were held in October 1933. Diwan Bahadur Sir T. Vijayaraghava Acharya Avargal, K.B.E., Vice-Chairman of the Imperial Council of Agricultural Research, presided over the Conference. Fifteen papers were read and discussed at the Conference.

III.—SEASON.

14. The outstanding feature of this year's season was the early advent of the south-west monsoon, about the middle of May. The rainfall was heavy on the West Coast till the end of September with occasional breaks. The monsoon was generally weak in most of the other districts in the month of June. But in July it became vigorous, and the rainfall was above the average in the Circars, Bellary, Anantapur, Coimbatore, Madura and Tinnevely. The rainfall in August was above the average in all districts except in the Circars, South Arcot and Chingleput. In September the monsoon was on the decline, and the rainfall during the month was generally below normal. It may be said that the south-west monsoon was on the whole satisfactory and that the rainfall from June to September was bordering on or above the average in the Presidency except in Vizagapatam, Kurnool, Cuddapah, the Carnatic, Chittoor, North Arcot and Tanjore.

The weather conditions that prevailed in the first fortnight of October were characteristic of the transitional period from the south-west to the north-east monsoon. The storm that passed between Cocanada and Masulipatam on the 18th October caused heavy rainfall especially in the Circars; there were floods in parts of Ganjam, East and West Godavari. But the rainfall in November was only normal or a little above normal in the districts of Kistna, Guntur, Kurnool, Bellary, Madura, Ramnad and Tinnevely. On the 17th of November there was again stormy weather, and strong winds crossed the East Coast near Nellore and caused some damage in the Nellore district. A severe cyclone swept over the Coromandel Coast on the 16th and 17th December resulting in heavy rainfall, especially in Nellore, Madras, Chingleput, South Arcot and North Arcot districts. There were floods in these districts, and considerable damage was caused thereby. The rainfall in the first half of January was above normal generally. On the whole, although the north-east monsoon was bordering on or above the average except in Cuddapah, Tanjore and Tinnevely, the rainfall was not quite evenly distributed.

The effect of the season on the crops at the various Agricultural Research Stations is described below :—

The season was generally favourable for the paddy crop at the Berhampur Rice Research Station. The cyclonic winds and the heavy rainfall in October caused wholesale lodging of sugarcane crops at Anakapalle, and considerably damaged even other crops at the Agricultural Research

Station, Samalkota. At the Paddy Breeding Station, Maruteru, the season was quite favourable to 'Basangi' paddy which gave record yields while 'Akkulu' in ears was lodged as a result of the rains in October. Chilly and fodder jonna crops at the Agricultural Research Station, Guntur, were adversely affected by the November rains. At Nandyal, the sorghum crops were damaged by severe winds in the month of September, while at Hagari the heavy downpour of rain in November-December contributed to the appearance of leaf shedding of cotton.

The severe cyclonic weather followed by the torrential rains of December resulted in complete inundation of the fields and lodged plantains, sugarcane and castor and caused considerable damage to paddy and other crops and the farm buildings at the Palur Agricultural Research Station; the Palakuppam Agricultural Research Station fared no better, the tall grown castors being lodged very badly. At Aduturai Agricultural Research Station, the rainfall was deficient, but the effect of the cyclone was none the less severe. At this station, the plantain crops just then in bearing and sugarcane were laid low by the cyclone. The season was favourable to crops other than pulses at the Agricultural Research Station, Koilpatti. At the Agricultural Research Stations in the West Coast, both the monsoons were unfavourable for the proper growth of pepper but highly beneficial to coconuts. At the Agricultural Research Station, Nanjanad, the season was good for the main season crop of potato, samai and lupin, but the second season crop of potato suffered somewhat from drought and frost. At Coimbatore, though the rainfall was unevenly distributed, the season was favourable to summer groundnuts, cholam, paddy and cotton. The Livestock Research Station, Hosur, had deficient rainfall and consequently the pastures were poor.

IV.—RESEARCH.

A.—Botany.

15. Nearly 600 botanical specimens were identified for the Herbarium and for various correspondents including Government departments. One thousand eight hundred and ninety-seven sheets were incorporated into the Herbarium. Five Herbarium specimens of sweet lime and three of *Phoenix humilis*, Royle, var. *pedunculata*, were sent to the Director, Royal Botanic Gardens, Kew. Six hundred and forty-seven duplicates were forwarded to the Director, Botanic Gardens, Singapore, and the Principals of Bombay Wilson College and the Government Victoria College, Palghat. One hundred and ninety-six specimens were received in exchange from the Curator, Arnold Arboretum Harvard University, United States of America.

The experiments on the study of fodder grasses and forage plants were shifted to another field at the Central Farm, Coimbatore. *Chloris Bournei*, *Rang* and *Tad*, was added to the fodder grasses already under trial. The nut grass eradication experiment with sodium arsenate at 300 lb. per acre in the form of 4½ per cent solution in water was continued and the application of this weed-killer was done for the fifth time. Results would be recorded after the south-west monsoon rains.

The study and survey of bananas and plantains was continued. Godavari and Vizagapatam agencies were surveyed during the year. The Madras bananas collected so far were tentatively classified into 11 groups consisting of 37 varieties and 10 sub-varieties.

B.—Chemistry.

16. The work of this section may be divided into two main groups, (1) advisory, and (2) research.

Under group (1), comes the analytical and advisory work done by the section in respect of enquiries made by departmental officers and the public. Eight hundred and fifteen samples consisting of soils, manures, feeding stuffs, fodders, plants, etc., were analyzed. A sum of Rs. 477 was realized as fees for the analyses done in the section as against Rs. 883 in 1932-33 and Rs. 250 in 1931-32.

(2) *Research*.—A special feature of the section's work during the year was with reference to problems connected with sugarcane and its products, and particularly the evolution of a simple process for the production of cream jaggery and white sugar by the open pan method using activated charcoal from paddy husk. A few co-operative societies in Coimbatore and North Arcot districts carried out large scale tests of this process and expressed the opinion that the process was economically feasible.

The systematic study of the soils of the Agricultural Research Stations in the Presidency was continued. Besides this, work on base exchange, study of clay fractions and the relationship between the physical properties and the composition of soils as also soil moisture experiments were in progress. The Azotobacter method of measuring the fertilizer requirements of soils was found unsuitable, as a majority of our soils are too alkaline in reaction.

Work was started during the year to find out the best and the cheapest method of converting bone into fine bone-meal so that bone-meal could be prepared in villages and used as manure on a larger scale than now. Caustic soda was effective in making the bones very brittle, but the bone-meal obtained by such treatment was too alkaline to be applied to our soils. Light charring of the bones by heat rendered them sufficiently brittle to be broken into pieces when crushed between stones.

The experiments on the composting of nightsoil show that, by using road sweepings and nightsoil in the proportion of 4:1 and by sprinkling a 0.5 per cent solution of common salt or a 0.025 per cent solution of copper sulphate, it is possible to convert nightsoil into an odourless manure without loss of nitrogen and without breeding flies.

The study on the influence of manuring on the quality of the crop was continued. Eri silk-worms fed with leaves from cattle-manured castor plants reproduced better, and yielded more silk than worms fed on unmanured castor plants or those treated with mineral manures. That the superior growth promoting value of cattle-manured crops was due to their high vitamin content was further confirmed. The results obtained this year show that the better nutritive value of cattle-manured grain is due not only to fat soluble vitamins but also to the nature of the proteins formed under the system of manuring.

With a view to explore the possibilities of extending the crushing season of sugarcane, the effect of planting and harvesting sugarcane in all the months of the year was under study. The crop planted in February to April gave the best yield of cane with juice of superior quality. Crops planted after June were poor in all respects throughout the Presidency. It was found that arrowing in sugarcane was soon followed by cessation of vegetative growth, and that, under ordinary conditions, no deterioration of sugar occurs till the advent of the harvest period.

C.—Crops.

(1) Cereals.

17. (a) *Millet*s—(i) *Sorghum*.—At the Millet-Breeding Station, Coimbatore, about 1,000 units of this millet were handled during the year for economic as well as scientific studies. The old strains continued to hold the field. Special mention may be made of A.S. 367, a strain of irrigated white cholam, which proved a great success in Chittoor and Koilpatti. Preliminary yield trials were in progress for evolving a good red cholam strain for Salem, a good *Talai-Virichan* type for the Chittoor area and a good rainfed white cholam for Tenkasi tract in Tinnevely district. Breeding work on *irungu* cholam, the famous fodder variety of the south, was continued.

At Hagari Agricultural Research Station, none of the *Sorghum* strains under trial were found equal to the T.-1 strain evolved at the station years ago. Six sorghum types introduced during the year from Bombay Presidency did not fare well.

At Nandyal four new strains, 28/3, 29/68, 25/102 and 25/106 were released for district trials. At Koilpatti 15 selections of *Periamanjil* cholam and 52 of *Irungu* cholam were carried forward for further selection.

The results of the spacing experiment on sorghum at Hagari show that the most suitable spacing in respect of grain varies from season to season according to the rainfall. This year on account of good rains, a wide spacing of 24 inches as against 13½ inches by the local method has been found to give the best results. The best spacing and time of sowing for fodder sorghum was under study at Nandyal Agricultural Research Station. Early July sowing gave the best results, but no difference in yield was noticeable in the crop sown with different spacings. The experiment on the grading of jonna seed started at Guntur Agricultural Research Station on the lines followed in Hagari and Nandyal showed a slight increase in favour of big-sized seed.

In the manurial experiments on the direct effect of artificials and cattle manure on sorghum at the Agricultural Research Station, Hagari, the results obtained show practically no difference in grain values while those of straw are not very appreciable. The residual effect of the artificial manures on cholam was more pronounced, and the differences are significant both in the case of grain and straw. At Nandyal sorghum crop has always responded well to direct application of the above manures. Even the residual effect is more than is the case at Hagari. But on the basis of cost of manures the increased yields at present prices do not even cover the cost of manure. For the application of artificials to be economical, either their cost should go down considerably or the price of cholam must rise appreciably.

(ii) *Ragi (Eleusine coracana)*.—During the year over a thousand units of ragi were handled at the Millet-Breeding Station. Six series of comparative trials were laid out. E.C. 593 continues to be the best strain. This year it gave 18 per cent higher yield of grain than T-8, the local strain. At Koilpatti, however, this strain which had given 62 per cent increased yield in the first trial was found to be on a par with the control in the year under review. At Palur E.C. 47 was found unsuitable but E.C. 1320 and E.C. 593 gave 18 per cent increased yield over control. Economic work on rainfed ragi for South Arcot, Chittoor and Kollegal commenced during the year, and many varieties are under study for the isolation of good strains. Selection work on ragi continued at the Anakapalle station on the same lines as in the previous year. Three or four promising strains are under comparative trial. Among the selections in summer ragi, No. 33 gave a significant increase of over 25 per cent over the control.

(iii) *Korra (Setaria Italica)*.—Strain S.I. 523 continued to be the best. Fifty-seven pounds of seed of this strain was distributed in the Coimbatore district and its yield favourably reported upon. The trial was a success in Anakapalle also, but in Salem district which adjoins Coimbatore, it did not do well. No differences were obtained from the comparative trials of *Korra* strains at Nandyal. About 105 single plant selections of this crop were

sown at Hagari including the two selections received from the Millet-Breeding Station. The latter were poor, and the most promising of the local types are being carried forward for further selection work.

(b) *Paddy*.—The year under review was marked by the phenomenal fall in the prices of this most important staple food crop of this Presidency. Because of the poor prices, paddy has ceased to be a paying crop in several parts of the Presidency, and attempts have been made to grow more remunerative crops. There are many practical difficulties in the way, and rice has perforce to continue as an important crop on the major part of its present area. There is thus need to do all that is possible to increase the outturn and reduce the cost of cultivation so as to bring the cost of production to the barest minimum possible. A Special Officer has been appointed for making enquiries regarding the present condition of rice production and marketing. It is hoped that on the basis of the material collected by him, it will be possible to propose measures for improving the economic position of rice production.

The following figures on the economics of rice-growing will be interesting. The figures have been taken from the areas set apart for demonstration purposes where all possible improvements in the cultivation of the crop are carried out. Under Coimbatore conditions a net profit of Rs. 65 per acre was obtained even at the present low prices with a single crop of paddy. At Pattambi the same amount was realized but from two crops of paddy. At Maruteru the net profit worked out to only a third of that obtained at Coimbatore.

Breeding work.—At the Coimbatore Paddy Breeding Station a new strain, Co. 9, was released for introduction in Tinnevely district. Two other strains which were reported to be in the trial stage in the previous year have fared well, and it is likely they will be released in the coming season. The Tambraparni valley will then have a number of strains for the cultivators to choose from. Of the disease (piricularia)—free selections from GELB. 24 × Korangusamba, six selections have not only proved resistant to the disease, but have also given increased yields over the susceptible variety ranging from 18 to 50 per cent.

At Maruteru 46 strains belonging to three varieties, in which Maruteru strains Nos. 1 to 8 had been released in the previous year, were compared against the released strains. In only one case there is some promising material. Ten strains were under district trials at 21 centres in the districts of West and East Godavari, Kistna and Guntur. Except one of the strains of *Atragada* doing well in Guntur district, none of the others showed any outstanding promise over the strains already released.

Adt. 9 and Adt. 11, two new strains of *poonkar* and *Nellore samba*, respectively, were released from the Paddy Breeding Station, Aduturai. Seven hundred and twenty-three single plant selections including progenies of crosses carried forward from previous years were under study, and about 300 promising ones from these were retained for further study and for yield trial in strips. Of the Nellore samba selections, none of the 15 strains under trial gave any significant yield over AEB. 65, which has already been distributed in the district since some years.

At Pattambi, 13 improved strains, 7 of the first crop and 6 of the second, were under district trial for the first time. They yielded 10 to 15 per cent more than the local varieties and will therefore be released in the coming season for general distribution in the districts. One hundred and sixty-five strains of the various West Coast varieties were under yield trials and 380 new selections were under observation.

At Berhampur, seed free from red rice selected from out of the five important local varieties were grown as bulk for immediate distribution in the tract. Of the 2,000 single plant selections under trial, some yielded up to 40 per cent more than the adjacent controls. New selections were made in two other varieties. In the varietal trials GEB. 24 and Krishnakatakullu from Maruteru compared favourably with *byyahunda*, the premier variety of the tract.

At Samalkota Agricultural Research Station, 13 varieties chiefly intended for seed purposes were grown on a large scale. A new strain, 3-A, was released from this station during the year and it gave a high yield of over 3,500 lb. of grain per acre.

18. *Agronomy*—(i) *Cultural experiments*.—The superiority of transplanting over broadcasting was found to be true in the case of also a short duration variety like *kar*. With regard to optimum age of seedling to be transplanted, differences in age from 25 to 70 days did not have any significant difference in yield under Coimbatore conditions. Double transplantation of seedlings was found to be more economical and resulted in increased yields at Samalkota Agricultural Research Station. In the spacing experiments at the different stations, it was found that the optimum spacing varied according to locality and variety. The optimum spacing for Maruteru conditions is greater than that in Coimbatore and Berhampur. The effect of summer cultivation of paddy on the yield of the succeeding crop of paddy was under study at Aduturai. The results show that summer cultivation of paddy soils of the Tanjore delta is definitely harmful. At Samalkota the experiment on dry ploughing was continued with another treatment in which the *Tolakari* dry ploughing was supplemented by a puddling before transplantation. The results confirmed previous experience while the additional puddling has contributed a fair increase in yield. With regard to the effect of environment on awning in rice, the results obtained at Aduturai station have confirmed the previous

experience that closer spacing and manuring induce greater development of awning in rice, the varieties experimented upon being ADT. 4 and AEB. 108.

(ii) *Manurial experiments*.—Experiments in progress in the paddy-breeding stations to determine the best time of applying ammonium sulphate to paddy crop show that the manure is best applied one month after planting at Pattambi, six weeks after planting at Coimbatore and two months after planting at Aduturai in respect of a long duration variety like ADT. 1. The five years' scheme of subsidized manurial trials at Maruteru came to a close. The results of the present year have again shown that higher yields are obtained with artificials in combination with green manure. As manuring the second crop was found to result in markedly increased yields, proposals are afoot to continue the trials for another three years, changing the application of the manures to the second crop instead of the first as hitherto.

(2) Fibres (Cotton).

19. (i) *Breeding*.—The three new strains of Cambodia cotton which were found to be better than the present strain, Co. 2 in the comparative yield trials of last year did well this year too, and yielded on an average better than Co. 2, but the increased yields were not statistically significant due to inequalities in soil fertility. A small consignment of Cambodia cotton seeds was obtained from Indo-China and sown during the year for making fresh selections. Of over 2,500 families grown in preliminary row tests, about 280 proved better than the local standards.

At Koilpatti, strain No. C. 7 has been holding the field for a number of years. Strain No. 546 (Karunganni) evolved subsequently was found to be defective in its ginning outturn though the yields were good, and it does not therefore find favour with the ryots. Two new strains were under comparative trials during the year along with the six of the previous years. The two new strains Nos. 2681 and 2682 as also the earlier strain 2622 are quite promising. The last mentioned has also done well in the district trials in three centres. None of the 250 Cambodia cotton selections at this Agricultural Research Station gave any significantly high yield, and the whole lot was therefore discarded. The Nandyal and Hagari strains were also discarded for the same reason.

At Hagari the eight strains of herbaceous type which were in comparative yield test last year were tried again this year, and three of them fared better than H-1. At Nandyal there are a few promising strains in respect of spinning values, three of them being up to the standard of N. 14 giving a spinning value of 42's. Of these strains, No. 556 has on an average given the highest yield. These strains have also been taken out into the district for trial under local conditions.

In Guntur where the selection work is done on *Cocanadas*, about 150 single plant selections were under test with No. 171 as the standard. Twenty selections were under purity test. Three new selections were added to those under comparative yield trial. Strain No. 20 gave the highest yield of about 25 per cent over the control.

(ii) *Agronomy*.—The rotation experiments detailed in the last year's report were continued at the Cotton Breeding Station, Coimbatore. They show that the type of soil has a greater influence on the choice of rotational crops than the extent of water-supply. On a sandy soil it is advantageous to grow groundnut before cotton, but on alkaline lands cholam or ragi does equally well. Mixing pulse with the cereal resulted in higher yields of grain on rainfed lands, but the quantity of fodder was reduced. The irrigation experiments point to the conclusion that irrigation once a week gives the highest yield and that there is not much difference between watering given once in two weeks and once in three weeks. From an economic aspect, it has been found that irrigating once in three weeks is more profitable than even irrigation done once a week. The intercultivation experiments show that intercultivation with *danthulu* raises the soil temperature by 1° F. at 16 inches below surface, while the use of a country plough or a junior hoe does not bring about any such change. The working of the *danthulu* would thus seem to conserve soil temperature better than the stirring action of the country plough or the junior hoe.

The manurial experiments with 2 cwt. of ammonium sulphate and 1 cwt. of super phosphate generally show that cotton does not respond to direct manuring. The residual effect of the manures was found to persist even in the third year in the experiments at Koilpatti.

(iii) *Schemes financed by the Indian Central Cotton Committee*—(a) *Madras Herbaceum Scheme*.—Several crosses between geographic races of herbaceum cotton were effected during the year with a view to increase the ginning percentage and spinning quality. Some of the hybrids of *Uppam* and *Karunganni* have given not only high increased yields over their parents but also lint of much better quality. But this behaviour has been found to decline quickly in the succeeding generations. If the high performance is to be kept up, F-1 population has to be raised every year, but the work of crossing is necessarily slow and demands some patience and skill which the ordinary farmer can ill afford to give in his farm routine. Methods are being devised to overcome this difficulty. It has been found this year that emasculation of flowers can be done effectively and quickly by smearing the staminal column with clay. It is proposed to demonstrate this method to a few ryots in the coming season. If the trials are successful, it will put the production of F. 1 seeds within the easy reach of every farmer.

(b) *The Madras Pempheres and Physiological Scheme*.—A number of varieties of cotton were tested for their susceptibility to the stem weevil. Plants selected for tolerance in Co. 2 during the past two seasons were also found to be equally susceptible to the insect attack during this year. Production of early types was sought to be achieved by crossing Co. 2 with Uganda and by a novel Russian process called 'Vernalization.' It was also found this year that drying the pulled-out stems in the sun for a week or ten days proved fatal to all the stages of the insect. Extensive studies were undertaken during the season to estimate the loss in the productive capacity of the crop on account of stem weevil attack. Stem weevil causes not only death in plants but also damages them by producing weak regions in the hypocotyl.

(c) *The Madras Fodder Cholam Scheme*.—The highly depressing effects of the *cholam* crop on the succeeding cotton was sought to be remedied by harvesting the fodder crop in its shot blade stage and manuring the crop adequately so as not to result in poor yields by the crop being cut at an early stage. Thick sowing of the fodder *cholam* crop brought about the desired effect. Another line of attack consisted in the search for an alternate fodder crop for the tract, either pure or mixed. Sowing of *pillipesara* (*Phaseolus trilobus*) in the same line with *Irungu cholam* appears to give the best yield. Other lines of attack like deep ploughing and a study of the colloidal aspects and of the dispersion ratios of the several soils were in progress to solve the problem in its various aspects.

(d) *The Madras Nadam Scheme*.—This is a new scheme started during the year with the object of evolving annual types suited to the soils where perennial *Nadam* cotton is grown now. Eight acres were leased out for this trial at Perundurai in Coimbatore district. *Uppam*, *Karunganni*, *Cambodia* and crosses between *Cambodia* and *Uganda* were sown in two periods, July and September. Sufficient data were obtained for concluding that the evolution of good yielding annual types would be possible and that types which would be suitable for September sowings should be preferred to those adapted to July.

(3) Fodders.

20. The study on indigenous fodder grasses was continued in the Central Farm, Coimbatore. Comparative trials of *cholam* and *cumbu* as fodder crops conducted at the Central Farm show that *cumbu* gives nearly double the yield. Work on selection of suitable fodder *cholam* strains was in progress in Nandyal and Koilpatti. At the former station some of the selections yielded better than the standard N. 23/10. *Teosinte*, which was grown on a field scale at the Livestock Research Station, Hosur, grew about 10 feet tall with profuse tillering and yielded good fodder.

and hay. *Pillipesara*, another fodder crop, which has been introduced in all parts of the Presidency in recent years, was grown mixed with Teosinte at Aduturai Agricultural Research Station. After the harvest of Teosinte, pillipesara did very well and gave an acre yield of nearly 11,000 lb. of fodder in a single cutting. *Kikuyu* grass is under experimental cultivation at the Potato Research Station, Nanjanad.

In the West Coast, hill grass springs up plentifully on dry land as an aftermath of the monsoon rains, but most of it is wasted and there is always fodder scarcity in the summer. To get over this difficulty ensilaging the hill grass has been successfully carried out and during the year nearly 95,000 lb. of hill grass were ensilaged at the Agricultural Research Station, Pattambi.

(4) Fruit.

21. Research on fruit cultivation continued to receive increased attention during the year. The experimental budding of citrus varieties continued on the same lines as last year in the Pomological Station, Coonoor. Nearly 500 stocks were budded of which only a third were successful. The climatic condition of the Nilgiris is not perhaps suitable and this method will therefore be discontinued. Grafting by 'approach' method has been found more suitable as almost all the trees, about 100 in number, which were grafted by this method, show signs of having united satisfactorily. Experiments in budding and grafting plums, apples and pears were in progress to find out varieties of good stocks. Experiments on mixed grafting to find out the possibilities of growing two varieties of plums on a single stock as also on secondary grafting were in progress.

Plantains.—Varietal trials and various problems connected with plantain cultivation were under study at the Central Farm, Coimbatore, Anakapalle, Maruteru, Samalkota, Aduturai and Kallar. A systematic study of the different varieties of plantains was taken up at the Central Farm, Coimbatore. Ripe fruits of 44 varieties were preserved with natural colours for reference and study. Experiments at Maruteru to find out the effect of planting in singles and doubles on total leaf production, flowering, number and weight of fruits, etc., show that flowering is definitely late in the case of double planting. The manurial experiments at Kallar show that the completely manured crop matures earlier and also yields slightly more. Research on the preparation of plantain figs was continued at Samalkota and Aduturai. In the latter station, very good results were obtained and the method has been copied outside. A sample of plantain figs of Poovan variety prepared at this station and sent to Patna at the instance of the Director of Agriculture, Bihar and Orissa, was very favourably reported upon by the trade and the public. The 'Chakrakeli' variety is particularly suitable for the preparation of figs.

(5) Oil-seeds.

22. (i) *Groundnut*.—Among the spreading varieties, *saloum* has again topped the list with an increase of 26 per cent over the local variety. In the district trials also it has done well except in a few centres. The variety has also been found to be drought resistant. Among the bunch varieties no variety has yet been discovered which yields better than the local *Gudiyattam* bunch. A number of selections among the spreading varieties appear to be promising, and it may be possible to evolve a pure line strain in a couple of years.

The practice of damping groundnuts before shelling and its effect on the quality of groundnut were under investigation. Storage experiments with groundnut kernels having different percentages of moisture were also carried out. The deterioration would seem to take place when damp kernels were stored in the godowns. Even three days' drying in the sun was found inadequate. This shows how important it is to store only well dried groundnuts in the godown.

(ii) *Gingelly*.—A number of selections have been made from different varieties of gingelly. A number of foreign varieties were also under trial. Attempts were made to cross *Sesamum indicum* and *Sesamum radiatum* but no success was obtained. The variety of *sesamum* obtained from Palni appears to be a good yielder. The results of spacing trials show that wider spaced plants are in every respect better than the closer spaced plants.

(iii) *Castor*.—At Palakuppam, the variety *Namakkal* rain-fed yielded best. At Coimbatore, both *Namakkal* irrigated and rain-fed varieties were found to yield well. Twenty-four varieties obtained from Russia were under trial. These varieties were found to be early and grew to a height of only 3½ feet.

(iv) *Coconut*.—The lines of studies detailed in the last year's report were continued. About 500 coconut seedlings from the nuts obtained by artificial crossing and selfing in selected coconut palms were planted at Nileshwar coconut breeding station. Seedlings of crosses between 'dwarfs' and 'tall' types of coconut palms were got ready for planting. Frequency of associations between the several morphological characters and the yield of coconut palms were worked out during the year to enable the selection of parent trees in hybridization work.

(6) Root Crops.

23. *Potato*.—Investigation in this crop is confined to the Agricultural Research Station, Nanjanad. The work consists mainly in selecting suitable varieties for the Nilgiris conditions and testing methods of cultivation and manures. Twenty new varieties were tried in the year among which four were found promising, viz. Bishop, Gharwal, Kharrar and Windsor Castle. Ben

Cruachan, Great Scot and Royal Kidney, three of the earlier selected varieties, are being grown by the ryots of the district to a very large extent.

There was not much difference between the several treatments in the manurial trials of inorganic nitrogen versus combination of inorganic and organic nitrogen in the second crop, but in the main crop inorganic nitrogen gave poor results. The beneficial effect of cattle manure was noticeable in all the experiments. The manurial experiments with municipal compost gave as good results as that of cattle manure in both the seasons.

Tubers of different sizes, viz., 1 oz., $1\frac{1}{2}$ oz. and 2 oz. were planted at 6", 9" and 12" apart along the drills, respectively. All the treatments gave the same yield. Whole seed was found superior to cut seed except in the case of *King Edward*. Three months' old seed was found to be superior in growth and yield to eight months' old seed, but when the size is increased to 4 oz., the difference in yield became nil.

New experiments on the effect of phosphatic manures on the potato crop, incorporation of fertilizers well into the soil versus the usual method of applying, irrigating before planting versus irrigating immediately after planting, keeping quality of seed from different manurial trials, etc., were started during the year.

(7) Spices, Condiments and Narcotics.

24. (i) *Pepper*.—This year's season was very unfavourable for the pepper crop. The yield this year was only $78\frac{1}{2}$ lb. from an area of about 30 acres as against 2,364 lb. in the previous year. Manurial experiments on pepper referred to in the last year's report were continued. As there are still several vines which have not come to bearing, this year's results cannot be considered as conclusive. The investigation on 'Pollu' was discontinued.

(ii) *Chilly*.—Work on this crop is mainly confined to the Agricultural Research Station, Guntur. The previous year's single plant selections, specially selected as thrip resistant, were under yield test during the year. In spite of adverse weather conditions and a bad form of thrips, the selections fared much better than the local types. About half a dozen selections gave 70 per cent increased yields over the control. The thrip control experiments were continued on the same lines as in the last year. Spraying with nicotine sulphate gave an increased yield of 67 per cent over the control, next in yield was the crop treated with ash and lime.

(iii) *Tobacco*.—Out of 50 single plant selections made in the previous year from exotic and local varieties at the Guntur Agricultural Research Station, 22 were tested for comparative yields. Pusa types were found to rank next to Virginia types in developing bright colour under conditions obtaining at Guntur Agricultural Research Station. Several reciprocal crosses were

made between the local and the exotic types of tobacco like White Burley and Harison Special. The results of the manurial experiment show that the best yields are obtained by giving the crop complete fertilizers with a basal dressing of cattle manure at four cart-loads per acre every year.

(8) Sugarcane.

25. Research work on sugarcane was continued on an intensive scale at the Anakapalle Agricultural Research Station. Experiments on monthwar planting of sugarcane were in progress in almost all the Agricultural Research Stations with a view to study the effect of planting in different months on the growth of the crop and the quality of the juice. Sugarcane planted in the months of February–April and harvested the following year would appear to grow well and give juice of superior quality. The crop planted after June responded poorly in every respect. The seven hybrids (sugarcane and sorghum crosses) Nos. Co. 351 to 357 were 'short' cropped during the year at Anakapalle to study their behaviour on a field scale. Co. 351, Co. 352, Co. 353, Co. 355 and Co. 356 were found to be good yielders. Co. 351 was found to mature early with high sucrose content.

At Anakapalle it was found that sugarcane planted in the ordinary furrow method of planting gave slightly higher yield than that planted in trenches, but the crop in the latter method analysed better while no perceptible difference was noticed in the extent of lodging. The crop planted in the trenches had gaps due to heavy rain soon after planting. The results of this year cannot be taken as conclusive. The experiments on increased seed rate showed that the yields were not increased by using heavier seed rate. For a cane like M.A. 21, a seed rate higher than 12,000 setts per acre was not necessary. In the wrapping and propping experiments it was found that a slightly increased yield was obtained but the difference was so little and it was not commensurate with the heavy cost involved in wrapping and propping. A rotation experiment which was in progress at Palur Agricultural Research Station for the last ten years was concluded. The results show that it is detrimental to grow canes in alternate years and that it is economical to grow it once in three years, while good yields are obtained by growing it once in four years.

The result of the manurial experiments on sugarcane at Anakapalle Agricultural Research Station was vitiated by cyclonic winds. At Samalkota the application of ammonium sulphate by itself or in combination with castor or groundnut cake, was found to yield more than either castor or groundnut cake. The manurial experiment at Palur shows that ammonium sulphate is superior to sodium nitrate when used by itself or in combination with poonac. The best yields were obtained when potash and phosphates were added to 200 lb. of nitrogen in the shape of cake and ammonium sulphate.

(9) Miscellaneous crops.

26. (i) *Soya Beans*.—A number of soya bean varieties were under trial in almost all the Agricultural Research Stations. Pe Ngye 2529 and Kachi 2447 did well in most of the Agricultural Research Stations where they were tried. The varieties, Billocri and Tokyo, fared well at Maruteru. A bulk crop of Pe Ngye variety grown at Aduturai Agricultural Research Station gave an acre yield of over 1,700 lb.

(ii) *Redgram*.—Out of the eight strains under trial at the Cotton Breeding station two proved better than the control.

(iii) *Bengal gram*.—Of the 21 strains of bengal gram evolved at the Cotton Breeding Station, Coimbatore, four gave an increase of 25 per cent over the local mixture. Some of these strains were tested at Hagari, Nandyal and Guntur Agricultural Research Stations. Their performance in the first two stations was poor. At Guntur one of the strains gave an increase of 15 per cent.

(iv) *Sunnhemp*.—A number of selections of sunnhemp from varieties of different ages are under trial at the Paddy Breeding Station, Coimbatore. Attempts at hybridization with other species have not been so far successful. New species of *croton* obtained from America and Malaya are also under trial.

(v) *Vegetable crosses*.—Experiments on the crossing of the common vegetable crops were in progress in many Agricultural Research Stations. It is gratifying to note that a successful inter-generic cross has been obtained at the Anakapalle Agricultural Research Station in cucurbitaceæ (bitter gourd × snake gourd).

D.—Horticulture.

27. The Botanic Gardens at Ootacamund and Coonoor were maintained up to the usual standard and special attention was paid to growing cold weather annual flowering plants during the off-season with the result that there were always some flower plants in full bloom to add beauty to the gardens. Considerable additions were made to the collections of orchids and cactaceous plants. About 30 special plants were received from the Royal Botanic Gardens, Kew, chief of them being pomegranate seedlings. The Agri-Horticultural Society of India presented to the garden 20 packets of foreign seeds. Twenty seedlings of F. 2 generation of Abutilon hybrids were raised during the year. *Primula obcorica* varieties were successfully cross fertilized and 250 seedlings were raised.

E.—Implements.

28. A comparative study of wind velocities and windmill performance in different Agricultural Research Stations was continued. The 10-foot Alston windmill was removed from Chintaladevi and fitted in the Lam Agricultural Research Station. Two Webb windmills were recommended for trial by the Chrome Leather Company and Mysore Department of Industries.

The series of experiments carried out since some years past have resulted in the design of a Persian wheel water-lift of high efficiency. The lift has an efficiency of about 70 per cent for lifts of 21 feet using $2\frac{1}{2}$ gallons capacity buckets and having an output of nearly 6,500 gallons per hour. It costs about Rs. 200 and a medium sized pair of animals can work this lift with ease. The advantages of this lift are that it can be used for any depth by varying the number of links and the buckets. So far three lifts have been erected at Government Agricultural Stations and nearly half a dozen have been purchased by ryots themselves.

The testing of various ploughs was continued. Cooper No. 11 was found better than No. 25 in the long run. Three new ridge ploughs were also tested and reported upon. The bund forming implements manufactured by Messrs. Cooper Engineering Works and the P.S.G. & Sons Charity Industrial Institute were tested and suggestions given for improvement. Different mhothe wheels and seed drills were also tested. A bullock-cart fitted with pneumatic tyres supplied by Messrs. Dunlop Rubber Company (India), Limited, has been used as a conveyance for people. During the seven months of its trial there has been no puncture. It has also been found satisfactory in other respects. A similar cart was designed for the Agricultural Research Station, Nanjanad. 'Vasant' cane crusher requiring 8 h.p. manufactured by Messrs. Kirloskar Brothers was worked at the Central Farm, Coimbatore, for a period of six months and found to work satisfactorily with an extraction of 68–75 per cent. Three centrifugal machines were tested and experimented upon during the season. The one manufactured by the P.S.G. & Sons Charity Industrial Institute was working satisfactorily for over seven months.

F.—Livestock.

29. The total number of livestock at the end of the year including the breeding bulls at Madras was 540 as against 614 last year.

Cross-bred herd.—This herd has been considerably reduced. Most of the milch cattle of this herd are kept in Coimbatore to supply milk to the Agricultural College dairy. Cross-bred young stock are transferred from Coimbatore to Hosur for rearing. The cross-bred cows are served by Scindhi bulls in order to breed back to the country herd. The average milk yield was 13.8 lb. per day per cow.

Ongole herd.—The breeding of this herd at Hosur was discontinued. Most of the stock were disposed of during the year. The average milk yield during the period the herd was maintained, works out to 10.3 lb. milk per cow per day.

Scindhi herd.—This herd continues to do well at Hosur. The demand for bulls at present is more than the supply. There were 28.9 cows on the average throughout the year, and the daily average yield per cow in milk worked out to 12.9 lb. In the present

herd, two cows have yielded over 6,000 lb. of milk, three cows over 5,000 lb. and thirteen cows over 4,000 lb. milk in a lactation.

Kangayam herd.—The building up of a pure Kangayam breed by selection is being continued. As this is purely a draught breed, efforts are being made to improve the milk yield of the cows as well. On the average, there were 46.8 cows in milk throughout the year and the daily average yield was 6.1 lb. per cow in milk.

Sheep.—There were 117 sheep (Bellary breed) in this flock at the end of the year. 297.11 oz. of wool was obtained from two shearings which works out to an average of 2.14 oz. per head for the adult stock for the year. The highest individual wool yield was 6 lb. 14 oz. given by a white-black face ram.

Poultry.—Flocks of white Leghorns, Rhode Island Reds, Light Sussex, Black Minorcas, Chittagongs and country (Tellicherry) are maintained. Trap nesting is continued. White Leghorn and Rhode Island Red laid the maximum number of eggs in the pullet year which was 183 and 160.5 respectively.

G.—Entomology.

30. The work on the paddy stem borer, coconut beetles and chillies thrips was continued and additional data gathered in regard to the biology of these insects and control methods against them. Intensive studies were carried out on the cotton boll-worm, hairy caterpillar pest and pests on vegetable crops. Special attention was devoted also to the binomics of the natural enemies of many of the important crops pests, especially the hymenoptera parasites.

The apiary started in the previous year has now taken a definite shape. The average monthly strength of the apiary varied from 20–30 hives of the common Indian bee, *Apis indica*. The seasonal and the pasturage conditions were favourable and during the year, about a hundred pounds of honey were extracted from about a dozen hives during the months of December to March. The work on ericulture was continued and seventeen broods were successfully reared. Attempts to spin the cocoons into yarn have also been made in view of the fact that there is not at present a ready market for eri cocoons.

During the year, 287 reports on various entomological matters were received and attended to. Seventy consignments of various seeds, live plants, suckers, etc., were examined for insect pests, fumigated in all necessary cases and certificates issued.

H.—Mycology.

31. Investigations on the following diseases of crops were carried out during the year:—

- (1) Foot-rot of paddy, (2) mosaic disease of sugarcane, (3) Panama disease of plantains, (4) rusts on cereals, (5) leaf-shedding disease of cholam, cumbu and tenai, (6) boll-rot of cotton, (7) wilt disease of betel and (8) mildew and wilt disease of tobacco.

Seed treatment with fungicides prior to sowing has been found to be extremely effective in checking the foot-rot on paddy.

Of the sugarcane varietal trials conducted to test the susceptibility of varieties to 'Mosaic,' it was found that POJ. 2878 and Co. 335 were free from the disease throughout, Co. 213, Co. 360, Co. 361, B. 3412, E.K. 28, Poovan and Vellai were highly susceptible and Co. 402 and Co. 412 fairly resistant. An experiment designed to estimate the loss of tonnage due to mosaic in Co. 213 revealed a marked loss of 15 per cent in the weight of cane.

An experiment was laid out to determine an effective method of controlling the 'damping off' disease of tobacco seedlings. Among the various treatments tried, the burning of trash on the ground before the seed was sown was found to be the cheapest and the most effective.

Sixty-five specimens of diseased plants were received from different parts of the Presidency for examination and advice.

I.—Trial Plots.

32. During the year there were 565 trial plots conducted on paddy, ragi, sorghum, cotton and groundnut. In the I circle, *Potti Alukulu* and *Potti Basangi* paddy yielded 40 per cent and 25 per cent more than the local varieties. Krishnakatukulu paddy strain No. 1745 gave 30 per cent increased yield over the local Konamani in Tenali and some other centres in Kistna delta. Strains No. Adt. 3, 9 and 11 (the last being a further selection from A.E.B. 65) were tried in the II and V circles and they fared much better than the local varieties, the increased yield in all the cases ranging from 20 to 25 per cent. This is the first year of the district trial of strains evolved at the Paddy Breeding Station, Pattambi. Two strains of the first crop and three of the second crop varieties proved distinctly superior to the local varieties.

The results of ragi trial plots have established the superiority of E.C. 598 over local varieties especially in the IV, V and VIII circles. Of the six new strains of cholam tried in the VIII circle, three gave better results than the earlier strains.

In cotton, No. 171, a strain from the Cocanadas, was in the second year of trial in the Guntur district. In Gurzala sub-circle, where this was tried, it yielded, unlike last year, less than the local cotton. A new strain of Karunganni—No. 2622—has been put under district trial during the year in the VI circle.

Cambodia cotton trials in garden and dry lands were very satisfactory in the I circle, average yields obtained being 755 lb. and 217 lb. of kapas per acre respectively. In the Godavari district better yields were obtained averaging up to 800 lb. of kapas per acre in garden land. The results of trial of Cambodia cotton in alluvial wet lands of the Circars as a crop following paddy have not so far been favourable. The trial is being continued.

In Vizagapatam, Co. 213 sugarcane tried in wet lands with a single irrigation at the time of planting gave an increase of 36 per cent in jaggery yield over the local red cane. In the trial of varieties under normal district conditions in Vizagapatam, POJ. 2878 gave the highest yield of 51.78 tons per acre. Co. 281 was the next with an acre yield of 46 tons of cane. In the IV circle, Co. 213 and 281 proved better than Fiji B. In the VIII circle, the trials have established the superiority of Co. 213 and Co. 290 over the local varieties both in tonnage as well as outturn of jaggery. Sorghum crosses Nos. 352 and 355 have shown fair growth and they are under further trial for testing the quality of jaggery.

V.—DEMONSTRATION.

33. The concentration method of demonstration work in a few selected centres in each taluk started three years ago, as a result of the change in the departmental methods of demonstration, was continued during the year. Demonstration plots were confined mainly to centre villages. The total number of demonstration plots in the year was 1,746 against 2,733 last year. The decrease was due to a large reduction in the VII circle where the number fell from 1,552 to 215. Arrangements are being made to increase the number of demonstration plots this year. The demonstrations consisted of specific items of improvements on crops like paddy, sugarcane, cotton, ragi, fruit-trees, etc. There were demonstrations also on manuring as well as cultural operations like ploughing, intercultivation and sowing in lines. Manufacture of jaggery with improved cane crusher, furnace and other appliances was also demonstrated.

Exhibitions and Shows.

34. 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 of exhibitions and shows held during the year under report was 197 as against 168 in the previous year. The exhibition arranged in Christmas week in the Madras City was a great success, and attracted a large number of visitors. Visitors evinced a great interest in the departmental manufacture of cream jaggery and of sugar with centrifugals. Two gold medals were awarded for the excellence of the exhibits. Another large scale exhibition was staged in Nellore on the occasion of His Excellency the Governor's visit to the district. As in previous years the exhibition was arranged at Srirangam during the Vaikunta Ekadasi festival, and this was opened by the Hon'ble the Minister for Public Works. On these and similar occasions agricultural lectures were delivered by the agricultural demonstrators with the aid of magic lanterns. The number of lectures given during the year was 497.

During the year all the districts except the Guntur circle and the Nilgiris were toured by the three motor exhibition units of the department. Officers of the Industries, Fisheries, Veterinary and

Public Health departments toured with the exhibition vans and participated in the exhibition and demonstrations. A large number of castrations by the Burdizzo method was done in South Kanara district by the Veterinary Assistant Surgeon who accompanied the motor exhibition van in that district.

Items of Propaganda.

(1) Crops.

35. (a) *Methods of cultivation.*—Good progress was made in Vizagapatam in regard to the economizing of seed for planting paddy. In this circle the area under this improvement more than doubled during the year. In the IV circle this practice is reported to have spread throughout the circle. The increase of area under the improvement of planting paddy in singles and doubles has been remarkable in Tanjore and Vizagapatam districts. The total area under these two improvements in the Presidency is estimated to be 690,000 and 260,000 acres respectively.

Cheap iron ploughs approved by the department have come into more extended use through arrangements made with the manufacturers for their supply to ryots on easy terms. Details of ploughs and other implements purchased by ryots during the year are furnished under 'implements' below.

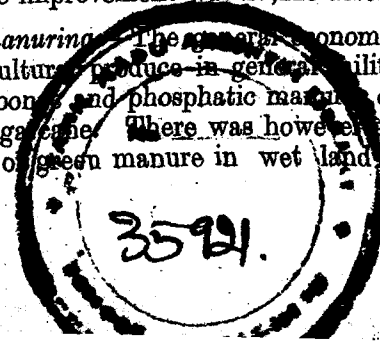
In the II circle, growing of turmeric on ridges was advocated and a number of ryots have taken to this improved method.

In regard to sugarcane, deep ploughing with improved ploughs like the Victory plough, line planting, trenching and wide spacing methods were introduced. In the I circle, the method of line planting and regular trenching was followed in 9,265 acres. Five thousand and thirty-six acres were brought under broad spacing. The total extent under these two improvements was more than double that of last year. An area of 582 acres in the V^o circle was brought under these improvements. One thousand six hundred and thirty acres of sugarcane were planted in lines in the VIII circle. The production of good seed material by the 'short' crop method mentioned in last year's report was continued in the I circle and an area of 73 acres was 'short' cropped as against 34 acres in the previous year. In the IV circle, this improvement was effected in 11 acres. The method of planting cane in trenches was introduced in 538 acres.

The drill sowing of Karunganni and line sowing of Cambodia cotton were continued to be advocated in the VI and VIII circles. The total area under the improvement was 17,118 acres.

(b) *Methods of manuring.*—The general economic depression and low prices of agricultural produce in general militated against a larger utilization of poona and phosphatic manure, especially for crops like paddy and sugarcane. There was however a corresponding increase in the use of green manure in wet land due to the

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cheapness of the method and constant advocacy of the improvements by the department. The total extent of this improvement in the Presidency is estimated to be 170,000 acres during the year.

(c) *Seed distribution—Cotton—(Cambodia).*—The distribution of Co. 2 Cambodia seed was largest in the VIII circle: 326,977 lb. of seed were distributed in the circle in addition to 498,600 lb. distributed by the Tiruppur Co-operative Sale Society under the Co. 2 seed extension scheme financed by the Indian Central Cotton Committee. The lint was sold at a premium of Rs. 8 per candy above the market rate. The seed farm area maintained by the Tiruppur Loan and Sale Society increased from 2,000 to 4,000 acres. The area of departmental seed farms was nearly 1,000 acres. In the VI circle, 102 acres of Co. 2 Cambodia cotton seed farms were arranged, and 42,249 lb. of seed distributed. Co. 2 was introduced in the III and V circles also, 7,238 lb. and 8,097 lb. of seed having been distributed to ryots in the two circles, respectively. In the IV circle, this strain was cultivated by ryots in about 100 acres.

Karunganni cotton.—About 650 acres of seed farms under A. 10 and C. 7 strains were arranged in the VI circle and 118,800 lb. of seed distributed. 111,310 lb. of seed of C. 7 strain were obtained from seed farms in VIII circle of which 101,321 lb. of seed were distributed. About 1,000 lb. of Uppam seed were also distributed in the Coimbatore circle.

'Westerns' cotton.—The scheme for the extension of H. 1 cotton in the 'Westerns' area referred to in the last year's report was worked partially during the year. A quantity of 201,897 lb. of seed was distributed including the quantity issued to seed farm ryots. Two thousand eight hundred and ninety-five acres were under seed farms. It is estimated that exclusive of seed farm areas, about 12,775 acres were sown to H. 1 during the year. The area due to natural spread under this strain is estimated to be 184,700 acres. A premium of Rs. 10 per bale of 400 lb. of lint over local cotton was obtained for the 253 bales of H. 1 cotton belonging to ryots, the sale of which was arranged by the departmental staff.

'Northerns' cotton.—The spread of N. 14 cotton in the Kurnool district received a great set-back due to its comparatively low yield and the poor premium paid by the purchasing firms. The introduction of this cotton was therefore confined only to certain villages in Koilkuntla taluk where its cultivation has been found to be profitable. Only about 60 acres of seed farms were arranged, and 10,683 lb. of seed distributed. The total area under N. 14 strain is estimated to be 3,194 acres as against 10,548 acres in the previous year. Some promising strains are in final stages of test at the Agricultural Research Station, Nandyal. With the release of these strains and improvement in the present condition of cotton prices, it is hoped that the area under departmental strains in the 'Northerns' area will be revived.

Coconut.—As in last year a demonstrator was deputed to the Laccadives for about nine months to demonstrate improved methods of cultivation. He was assisted by two islanders who underwent training at the Coconut Research Stations. The extension of coconut cultivation in the VII circle was at a standstill owing to low prices and the economic depression. Eleven thousand two hundred and fifty seed nuts and 545 coconut seedlings were distributed in all the circles except the I, III and IV circles. In the V circle, an area of 500 acres was intercultivated with iron ploughs, 20 acres planted with proper spacing, and 31 acres of plantation manured with green manure.

Groundnut.—The yield of groundnut is becoming less on account of continuous cropping without regard to judicious rotation of crops. This aspect was impressed on ryots and advice given on suitable rotations to be followed. In the VI circle, a heavier seed rate than now was advised in order that a good and uniform crop may be obtained as according to the ryots' practice with a low seed rate, the produce obtained is found to be of poor quality with a good proportion of immature pods. Seed of Gudiyattam bunch variety—nearly 8,000 lb.—was distributed in the VI and VIII circles.

Korai cultivation for mat-making.—No work was possible in the III and VI circles due to poor demand and low prices of mats. Lack of a good and ready market is a handicap in the rapid extension of korai cultivation. Its cultivation was encouraged in the II and IV circles in suitable localities. About 4,000 slips of korai grass were obtained from Nellore swamps and distributed in Kistna and Guntur districts. The area under korai in Cheyyar, Wandiwash and Vellore taluks in North Arcot district was 204 acres during the year.

Paddy.—The progress made in the distribution of improved strains of paddy was remarkable during the year. The total amount of departmental seed made available to ryots during the year in the whole Presidency was 1,677 tons as against 280 tons in the previous year. To augment the departmental supply, a large area of seed farms on ryots' land was arranged during the year. In the I circle, the extent of paddy seed farms was over 6,000 acres. Nearly 1,450 tons of seed were distributed. In the II circle, over 1,640 acres of seed farms were arranged and seed sufficient to plant about 32,000 acres made available to ryots. There is already an area of about 47,000 acres under improved strains in the circle of which 40,000 acres are in Kistna district. G.E.B. 24 has spread in about the whole of the paddy area in Hospet and Siruguppa taluks of Bellary district. In the IV circle, over 350 acres of seed farms were arranged during the year, and about 19,000 lb. of seed distributed. In the V circle, 40 tons of departmental seed and about 1,387 tons of seed produced by ryots were distributed. In this circle, a change was made in the method of seed multiplication by discontinuing the departmental seed farms and making the ryots self-reliant. The strains evolved at the Agricultural Research

Station, Aduturai, were distributed to ryot-seedsmen and Co-operative Agricultural Societies on the understanding that they distributed half the produce they raised as seed on the threshing-floor itself. G.E.B. 24 has spread widely in Periyar area. The area under G.E.B. 24 and Co. 3 on the West Coast was 50,500 acres against 48,730 acres in the previous year. The total area in the Presidency under the different strains of paddy is estimated to be about 800,000 acres including the natural spread.

Onions.—The area under what is known as 'Bellary' onions is on the increase in the VIII circle. 123 lb. of Bellary onion seed was distributed in the VIII circle during the year. In Coondapoor taluk of South Kanara district, the crop was raised in about 75 acres and it is likely that it will spread soon in this locality.

Pepper.—This is a common garden crop grown in house compounds in the Malabar district. It is however not cultivated as such in South Kanara. Head coolies trained at the Agricultural Research Station, Taliparamba, were deputed to plant pepper cuttings in the house compounds in Kasaragod, Mangalore and Puttur taluks of the South Kanara district. About 11,000 pepper cuttings were planted in South Kanara during the year. It is hoped that this method will gradually stimulate the cultivation of this crop in the district.

Potato.—Under seed farm conditions, 856 maunds of seed mostly 'Great Scot' were distributed in 24 villages in the Nilgiris. In addition, 1,236 maunds were sold outright. 4,568 lb. of seed-tubers were distributed in Krishnagiri and Hosur taluks of Salem district.

Ragi.—In the II circle, T. 8 strain gave good results as in previous years but the area is limited owing to its longer duration. It did not yield as well as local varieties in the IV circle.

Strain 525 evolved at the Agricultural Research Station, Anakapalle, has become popular in certain areas of Vizagapatam and an area of 321 acres was under this strain during the year. An increased yield of 34 per cent over the local was obtained in the southern taluks of Vizagapatam, but the yield in Palkonda and Chicacole was less by 13 per cent than the local variety.

E.C. 593 evolved at the Millet Breeding Station, Coimbatore, did very well in both the seasons in North Arcot district and Coimbatore circle and 2,021 lb. of seed were distributed. Besides being a better yielder, E.C. 593 also comes to maturity a week earlier than E.C. 47. The natural spread of the improved strains of ragi is estimated at 4,500 acres in the VIII circle.

Sorghum.—5,294 lb. of T. 1 strain were distributed in the III circle. The natural spread under this variety is estimated as 20,850 acres. This strain was evolved at the Agricultural Research

Station, Hagari, some years ago. A new strain, N. 23/10, evolved at the Nandyal Agricultural Research Station, is gradually spreading in the Nandyal valley. The area sown during the year has increased to 320 acres from 204 of last year.

A.S. 1543 evolved at the Millet Breeding Station, Coimbatore, has given increased grain yield ranging from 25–82 per cent over the local variety in Coimbatore and 10–19 per cent in Salem. The area in the VIII circle under improved strains of sorghum is estimated at 486 acres including 320 acres due to natural spread.

Sugarcane.—The extension of sugarcane cultivation received a great stimulus during the year. The duty on sugar as well as the slump in the rice market were primarily responsible for this. The evolution of some very good types of sugarcane like Co. 2, M.A. 21, Co. 213, Co. 281, Co. 290 and Co. 243 from the sugarcane stations at Coimbatore and Anakapalle has been very opportune. Nearly all the Agricultural Stations cultivated several varieties to be able to meet the increasing demand for seed material. It was not possible to meet the demand fully and ryots themselves propagated seed by the 'short' crop method. Ryots in Kistna district, and Repalle and Tenali taluks of Guntur district, made large profits by selling sugarcane seed material.

The cultivation of this crop made much headway in Ganjam and Vizagapatam during the year. The increase is marked in the three localities where sugar factories have sprung up. J. 247 still continues to be very popular and it is estimated to cover an area of 8,316 acres excluding its spread in the Agency areas, figures in respect of which are not easily available. Co. 213 has passed the trial stage in the I circle and is coming into favour, replacing the local red cane. In Vizagapatam district it has spread over 500 acres as against 50 in the last year. Co. 281, Co. 243, Co. 313 and P.O.J. 2878 are also promising and these are being grown by ryots to suit different conditions. The total area under improved varieties of cane in Vizagapatam district increased to over 3,000 acres as against a thousand and odd acres in the previous year. Due to successful introduction of improved varieties like Co. 213 and the prospect of two or three sugar factories being established in Kistna, the area under Co. 213 increased very rapidly in the district. In the course of last year the area under improved varieties in Kistna has reached 2,500 acres. Fiji B has practically ousted all other varieties in the South Arcot district, owing to its high sucrose content, Messrs. Parry & Co. still continuing to pay the highest price of Rs. 15 per candy of cane delivered at the factory. Eighteen thousand and five hundred setts of different improved varieties were distributed in the IV circle. In the V, VI and VII circles the improved varieties have just been introduced. Co. 213 and Co. 290 are becoming popular in Coimbatore. Improved varieties of sugarcane are under cultivation in about 1,100 acres. The sugar factory at Podanur has been revived.

The construction of improved furnaces for making jaggery continued to make progress, and 259 such furnaces were constructed in Vizagapatam, 49 in Bellary, 15 in the Trichinopoly circle and 29 in Coimbatore. Over 500 demonstrations on the method of preparing good jaggery were arranged in the I circle. Thirty-two demonstrations in the manufacture of cream jaggery were carried out with success in the I circle and 33 in the VIII circle.

Tapioca.—This was planted in 5 acres in Wynad (Malabar) and 14,500 cuttings distributed in Kasaragod (South Kanara). In addition, 1,000 cuttings were supplied to the Labour Officer for introduction in the depressed classes colonies in these districts. The crop is not commonly cultivated in the above districts.

(2) Fodder.

36. Pillipesara has become popular in almost all the districts. There is a large increase in the area under pillipesara in the Godavari delta, there being 7,300 acres during the year as against 5,675 acres in the previous year. Private merchants have now taken up the supply of pillipesara seeds in the II circle. Kolukattai grass seeds, guinea grass and elephant grass cuttings and seed of fodder jonna were supplied to ryots in varying quantities. The Madura municipality is now in a position to sell guinea grass from its sewage farm in large quantities. Ensilaging fodders like cholam, maize, ragi, straw and hill grasses was demonstrated and there were 28 silo pits during the year in I, VII and VIII circles.

(3) Fruit.

37. Special attention was paid, and all possible assistance given to ryots in matters connected with the layout of fruit gardens, the proper maintenance of old gardens and improvements like the pruning of fruit trees, irrigation by trench system, selection of suitable varieties for different tracts, planting, manuring and spraying against pests and diseases. Eight hundred and forty-five acres were brought under fruit cultivation in the I circle with departmental advice. In the II circle, advice was given for the proper maintenance of 400 acres of fruit garden. Thirty acres were brought under fresh plantation of different fruit trees like pineapple, mangoes, citrus, grapes, etc. The area under plantains in I circle which was about 2,400 acres nearly doubled itself during the year. In the III circle, the area under fruit gardens increased from 100 to 225 acres. The department arranged for the supply of a very large number of seedlings and plants of various fruit trees like sapotas, oranges, mango, grape vines, pineapple, etc. The area under cashewnut cultivation is on the increase specially in the VII circle. Over 6,000 cashewnut seedlings were supplied to ryots in the VIII circle.

A trial was made in sending Sirumalai plantain fruit from the VI circle to Patna. The fruit stood the journey fairly well in November while it got damaged when transported in May.

(4) Implements.

38. There was a steady increase during the year in the number of demonstrations conducted with different kinds of improved implements like light iron ploughs, H.M. Guntakas, etc. The total number of demonstrations during the year was 9,585 as against 6,800 in the previous year. It is not possible to estimate the correct number of ploughs and other implements purchased by the ryots during the year, as these are also supplied directly by the manufacturing firms. The number of ploughs supplied during the year has more than doubled that of last year. The increase may largely be attributed to facilities afforded to ryots to take advantage of takavi loans of small sums of Rs. 10 and 20 for purchase of agricultural implements, the loans being granted by the Deputy Directors themselves. So far as has come to the notice of the departmental staff, the following number of implements were obtained by ryots during the year :—

Iron ploughs	...	2,546	Archemidian screws.	13
Mhote wheels	...	112	Buckscraper	3
H.M. Guntakas	...	90	Sugarcane mills	4
Bund formers	...	15		

(5) Livestock.

39. There were 72 bulls under the premia scheme at the beginning of the year. Thirty-three new bulls were approved, of which 24 were farm-bred. Twenty-two bulls were removed from the list during the year, the majority of them having completed their three years under the scheme. The number of premia bulls at the end of the year was 83. In addition, there were 117 bulls at stud including those at Agricultural Research stations, jails and Veterinary hospitals. The improvement of breeds of poultry continued to receive the attention of the department. A large number of eggs and chicks of good breeds was supplied to the ryots.

The Ayrshire bull stationed at Kodaikanal was transferred to Madras. The eight breeding bulls stationed in Madras at the Veterinary College performed 602 services during the year. The milk supply to the General Hospital, Madras, was frequently inspected by the district staff and advice given to contractors and milk vendors in regard to improved methods of feeding and milking.

(6) Loans.

40. The rules were modified and the Deputy Directors delegated with powers of sanctioning loans up to Rs. 25 in each case for the purchase of agricultural implements. As was stated in the

paragraph under implements, ryots took advantage of the facilities offered. The following shows particulars of loans sanctioned for various implements :—

	RS.	A.	P.
(1) Ploughs	4,746	2	0
(2) Persian wheels	2,000	0	0
(3) Sugarcane power crushers	530	0	0
(4) Roll easy mhote wheels	710	0	0
(5) Horticultural implements	115	2	0
(6) Other implements	4,118	14	0
	12,220	2	0

(7) Manures.

41. *Farm-yard manure.*—The I circle continued to maintain its high level of progress made in the number of improved manure pits maintained during the year. The number was 9,499 in the year as against 5,278 in the previous year. The progress in the other circles was also fair as will be evident from the figures given below. The total number of improved methods of conservation of cattle manure adopted by ryots during the year is shown below :—

Manure pits	13,118
Dry earth sheds	3,545
Byres	64
Loose boxes	28

Compost.—The conversion of night-soil into poudrette was demonstrated wherever there were the requisite facilities. At the instance of the department, the municipalities of Calicut and Mangalore distributed poudrette free of cost to ryots for manuring paddy and sugarcane. Although the results are encouraging, yet the ryots fight shy of using this manure. In collaboration with the Municipal Health Officer, Bellary, about 100 tons of compost were made with municipal rubbish and night-soil. The nitrogen content of the resulting manure was somewhat superior to local farm-yard manure. The method of composting all farm waste such as litter, stubbles of crop, etc., was demonstrated in all circles. The total number of cases where compost was made during the year was 716.

Green manures.—These comprise mostly dhaincha, sunnhemp, wild indigo, pillipesara and the ordinary indigo. During the year a total quantity of 211 tons of green manure seed was distributed to ryots through the departmental agency. This excludes quantities of wild indigo and pillipesara seed, the supply of which has been taken up by private merchants.

Artificial.—There was an increase in the demand and use of fertilizers in the I, VII and VIII circles. The demand continued to be poor in the other circles. Of the several fertilizers in the

market, ammonium sulphate was in great demand for application to paddy and sugarcane crops. The need for the application of organic manures wherever artificial manures were in use was emphasized.

(8) Pests and Diseases.

42. Cases of insect pests and diseases in the districts were attended to by the Entomology and Mycology demonstrators attached to the circles and timely remedial measures carried out. The application of sulphur dust for smut disease on cholam was continued with success in the II circle and sulphur dust sufficient to treat 8,134 acres was distributed to ryots during the year. This method was also adopted in Salem during the year. A serious fly pest was reported in many riverside villages round Siddhout taluk in Cuddapah district. On examination, it was found to be caused by insects which were breeding mainly in the oil-cake used as manure for melons. Owing to unfavourable season, sugarcane flies became a serious pest in South Arcot; but by persistent hand-netting and bagging and by utilization of natural enemies, the pest was controlled satisfactorily. Control measures against thrips on chillies received special attention in the II and VI circles.

A survey of the plantain areas disclosed that the Panama wilt disease was not prevalent. 115,000 arecanut trees were sprayed with bordeaux mixture as a remedy against the 'mahali' disease of arecanut in Malabar; 3,000 trees were similarly treated in South Kanara. Remedial measures against "damping off" disease of tobacco seedlings were demonstrated in Kistna district where the disease was reported to be severe.

Work through other agencies.

(1) Co-operation.

43. Through the Loan and Sale Society at Anakapalle in the I circle, about 4,963 candies of jaggery were sold. Paddy seed to the extent of 44 cwt. was distributed through members of co-operative societies. The possibilities of starting marketing societies for groundnut were examined in Guntur district in consultation with officers of the Co-operative department.

With the help of the Co-operative department and the Central Banks at Cuddalore and Tiruvannamalai, the scheme for marketing of groundnut in the South and North Arcot districts was worked this year on the same lines as in last year. During the year, a special staff from both the Agricultural and the Co-operative departments were at this work in educating the ryots on the aims and objects of this scheme and the advantages thereof. Though much propaganda was done, ryots did not take full advantage of the organization. Owing to the fall in prices and adverse seasonal conditions the volume of work transacted at the several warehouses was below expectation.

Out of the nine Co-operative Agricultural Societies in the V circle, all but three functioned. Twenty-five thousand, three hundred and eighty-three pounds of paddy seed, 4,733 lb. of green manure seed and 2,045,195 lb. of artificial manures were supplied to members by these societies.

In the VI circle, the services of an agricultural demonstrator were placed at the disposal of the Cotton Loan and Sale Society, Koilpatti, which sold 7,625 lb. of cotton seed to various ryots. The Velur Agricultural Improvement Society sold 10,000 lb. of Karunganni and Cambodia lint through the Dindigul Loan and Sale Society.

With the joint efforts of the Co-operative and Agricultural departments, a co-operative loan and sale society for the benefit of the pepper growers was started during the year at Taliparamba in the VII circle. As the pepper growers had very little produce with them on account of the extremely bad season, regular working of the society was postponed to next year.

The Cambodia cotton seed multiplication scheme financed by the Indian Central Cotton Committee, Bombay, and worked by the Tirupur Co-operative Trading Society in the VIII circle, continued to work during the year. The quantity of seed distributed to ryots through the society was 498,600 lb. The Idigarai Agricultural Improvement Society near Coimbatore has undertaken the production and sale of cotton seed on the seed farm system. The cotton sale society at Tiruchengodu, Salem, is functioning in selling and marketing members' produce. Two credit societies in Salem district and two branch societies of Tirupur Co-operative Trading Society, Coimbatore district, were engaged in sale of seed and implements.

During the year, a scheme of rural development work was started in Tiruvallur taluk under the general control of the Director of Public Health. The other Government departments co-operated and deputed their staff to help in the work. Two Agricultural Demonstrators are working in the area. Propaganda work with the Agricultural Exhibition Van and Cinema Shows was carried on for about a week in each selected village in all aspects of rural development work. The camps lasted for about a month from 17th August. Village economic survey undertaken by the department was completed by the first week of December and the records handed over to the Secretary of the Scheme.

Experiments were carried out in the VIII circle at Perundurai and Modachur in co-operation with the Irrigation department to collect figures of duty of water, etc., in connexion with the Lower Bhavani Project.

The agricultural farm attached to Tanur school in the VII circle managed by the Devadhar Malabar Reconstruction Centre received attention at the hands of the department, and the usual annual grant of Rs. 75 and the services of a head coolie to run the farm were granted.

(2) Agricultural Associations.

The Ganjam Agricultural Association was revived during the year. It contributed a sum of Rs. 25 for the Agricultural Exhibition held at Chatrapur. The Vizagapatam District Agricultural Association contributed Rs. 21 for the Narasapatam Agricultural Exhibition held during the year. The Nellore District Agricultural Association held the Annual Agricultural and Livestock Exhibition on the occasion of the car festival at Nellore. The Trichinopoly District Agricultural Association has been doing good work. The agricultural and industrial exhibition staged at Srirangam during the Vaikunta Ekadasi festival in December-January was under its auspices. This association distributed 10,000 lb. of paddy seed. In addition three taluk associations in the district functioned during the year and distributed paddy strains to the members. The District Advancement Association, South Kanara, organized a flower and vegetable show at Mangalore during the year. It opened a fruit show at Mangalore for marketing fruits, flower plants and eggs produced in the district. The Agricultural Association, Palghat, maintained a breeding bull under the premium scheme.

VI.—LEGISLATION.

44. *Cotton Ginning and Pressing Factories Act.*—This Act continued in force during the year. The number of ginning factories in the year rose from 556 to 566 of which nearly 50 factories did not work during the season. There was no increase in the number of pressing factories. One factory at Sattur was removed to Tirupur during the year. Of the 67 pressing factories, six factories did not do any cotton pressing work. The number of prosecutions launched for infringement of provisions of the Cotton Ginning and Pressing Factories Act fell from fifteen in the previous year to two in the year under report.

45. *Cotton Transport Act.*—This Act continued in force during the year.

Fifteen single licences by rail were issued against 13 in the previous year for import of cotton into the southern area.

Annual licences.—Seven licences with 134 certified copies were issued during the cotton year 1933-34 (1st February 1933 to 31st January 1934) for use by mills in the southern area as against 12 licences and 268 certified copies issued in the previous cotton year. Only 102 copies were used as against 217 copies of the previous cotton year. In addition, 10 licences and 153 certified copies have been issued from 1st February 1934 to 31st March 1934 to the mills in the southern tract.

Import by sea.—Fifty-three licences were issued for the import of 24,718 bales of ginned cotton into Tuticorin as compared with 55 licences for 31,891 bales in the previous year.

46. *Cotton Control Act*.—This Act prohibiting the cultivation and mixing of pulichai (*G. neglectum*) cotton and its sale was enforced in Tinnevely, Madura and Ramnad districts during the year under report. In most of the cases pulichai was grown as a mixture and this was uprooted. Prosecution was launched in 128 cases of defaulters, of which 113 cases ended in conviction and the rest were pending at the close of the year.

47. *Cotton Market Act*.—The question of selecting Tirupur as the first notified area for cotton transactions under the Act is under the consideration of Government.

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

Cotton.—The Act was continued to be enforced in respect of the two insect pests, stem-weevil and pink boll-worm attacking Cambodia and Pachanadan cottons in the Coimbatore, Salem, Trichinopoly and Madura districts. The ryots on the whole have realized the benefits of the working of the Act and have of their own accord removed the plants except for some delay in certain cases. In Trichinopoly district except in two taluks, the eradication of the crop was not complete until the 16th October 1933. In Madura district an area of 700 acres mostly in Periyakulam taluk was not eradicated until the 5th November 1933. Two hundred and twelve defaulters as against 176 of the previous year were prosecuted. Salem district maintained its reputation of previous years, the crop having been removed completely before the 31st August 1933. In Coimbatore district, there was a marked improvement in the eradication; an area of only 3.47 acres remaining uneradicated on 1st September 1933 and this was removed by the 6th September. Eleven defaulters were warned and six were prosecuted. Field experiments were started to decide the question of excluding Angala Kurichi and Turaiyur villages of the Pollachi taluk from the operations of the Pest Act. The results are not yet to hand.

Groundnut.—The Act against the Red Hairy Caterpillar pest (*Amsacta Albistriga*) on groundnut continued to be in force in Vriddhachalam, Kallakurchi and Tirukkoyilur taluks of the South Arcot district, Tiruvannamalai and Polur of the North Arcot district, all the Government, inam and zamin villages of Andipalayam, Jayakundam, and Manapathur firkas of the Udayarpalayam taluk in the Trichinopoly district, and Salem and Rasipur taluks of the Salem district.

The pest appeared in all taluks of the South and North Arcot districts in varying degrees of severity and action was taken in time to save the crops. The attack was severe and caused much damage to the crop in the Udayarpalayam taluk of the Trichinopoly

district. In Rasipur and Salem taluks of the Salem district, there was no emergence of moth owing to good rains and the need for enforcing the Act was not felt.

Palmyra.—The Act in respect of budrot of palmyra brought into force at the close of last year continued to be enforced in the Palghat taluk of the Malabar district. Three agricultural demonstrators were specially detailed for this work. Action against defaulters had to be taken by the Revenue Department and for want of a Special Revenue Inspector the work did not progress rapidly. In all, 1,315 notices were issued and 26,460 diseased trees cut. A Special Revenue Inspector has recently been posted to attend to this work and it is hoped that good progress will be achieved in the current year.

Although the Act continues to be in force in the East and West Godavari, Kistna and Guntur districts since 1st April 1930, the powers conferred by the Act were not exercised in any case. As usual the demonstrators in these tracts have been giving advice to the ryots regarding the remedial measures to be taken. The question of strictly enforcing the Act in Razole and Amalapur taluks of the East Godavari district, where the percentage of trees was reported to be high in the previous year, was examined further and it was decided that the Act need not be enforced. Arrangements have been made to keep the affected area under observation and advise the ryots about the remedial measures necessary.

Water hyacinth.—The Act was in operation in certain taluks of Guntur, Chingleput, South Arcot, Tanjore, Madura and Malabar during the year.

VII.—PUBLICATIONS.

49. The undermentioned leaflets and bulletins were published during the year 1933-34 :—

Subject.	Leaflet Series.	Languages in which published.	Price.
23. Red Hairy Caterpillar Pest		English, Tamil, Telugu, Kanarese and Malayalam.	Free.
53. Prickly-pear cochineal		Malayalam. (English, Tamil, Telugu and Kanarese published in 1931-32.)	Do.
36. Budrot of palmyras and coconuts		Tamil and Kanarese. (English, Telugu and Malayalam published in 1932-33.)	Do.
46. Die back Disease of Cashewnuts		English, Tamil, Telugu, and Kanarese. (Malayalam under print.)	Do.

Subject.	Languages in which published.	Price.
<i>Leaflet Series—cont.</i>		
50. The Improvement of the quality of South Indian groundnuts.	English, Tamil, Telugu, Kanarese and Malayalam.	Free.
51. The Manufacture of white sugar by the open pan system.	Do.	Do.
52. Selection work in coconut	Do.	Do.
38. Water Hyacinth	Do.	Do.
53. Koleroga or Mahali disease of arecanuts and coconuts.	English. (Vernacular editions under print.)	Do.
54. Some advantages of Poultry-keeping. ..	English, Telugu and Kanarese. (Tamil and Malayalam under print.)	Do.
55. Natural incubation of Poultry	English and Kanarese. (Tamil, Telugu and Malayalam under print.)	Do.
56. Brooding and Rearing of Chicks	English and Telugu. (Tamil, Kanarese and Malayalam under print.)	Do.
57. Housing of Poultry	English. (Vernacular editions in print.)	Do.

Notes.

10. Maintenance of pure paddy in Ceded Districts.	English and Kanarese. (Telugu under print.)	Free.
11. Note on Panama disease of Plantains ..	English	Do.

Bulletins.

29. Tamil Sayings and Proverbs on Agriculture.	Tamil with English translation.	0 12 0
31. Telugu Sayings on Agriculture	Telugu with translation in English.	0 8 0
32. Fungoid diseases of important crops in Madras Presidency.	English	1 2 0
33. South Indian Fodders	Do.	0 4 0
34. Insects injurious to Vegetable and Flower plants in South India.	Do.	0 6 0
35. Kanarese Proverbs on Agriculture	Kanarese with translation in English.	0 1 0

50. *Books.*—The third revised edition of the Manual of Elementary Botany for India by Diwan Bahadur K. Rangachariar was published during the year.

The Villagers' Calendar for 1933-34 was published as usual in English and the vernaculars. The total number of copies printed was 57,800 as shown below :—

English	4,700
Tamil	19,800
Telugu	23,600
Malayalam	6,450
Kanarese	3,250

VIII.—STATISTICS.

51. *Weekly cotton Mill and Press Return.*—There were 28 spinning mills during the year as against 25 in the previous year, the addition of 3 mills being in Coimbatore. All of them continued to send their return of cotton received in their mills every week. Returns from the 67 presses and the Collectors of Customs were also received every week.

52. *Enquiry on the cost of production of crops.*—The scheme of Economic Enquiry into the cost of production of crops in the principal sugarcane and cotton tracts in India, financed by the Imperial Council of Agricultural Research for a period of 3½ years, was taken up in this province from the 1st April 1934. The districts of Vizagapatam, Bellary and Coimbatore were selected for the enquiry and a District Supervisor placed in charge of each district. Six villages have been chosen in each district for the enquiry under village investigators to carry on the work. The results of the first year's enquiry have been communicated to the Imperial Council of Agricultural Research.

Marketing of Rice.—At the close of the year, a Special Officer was appointed to make a study of the rice trade in this Presidency and suggest ways to improve the market conditions. The officer has been touring the districts obtaining statistics of production, stocks, movements and prices of rice in the Presidency.

IX.—EXPENDITURE.

53. The receipts and expenditure for the year 1933-34 and the corresponding figures for the previous year 1932-33 are as below :—

	1932-33	1933-34
	RS.	RS.
Expenditure	16,93,214	17,45,928
Receipts	2,02,372	1,86,065
Net expenditure	14,90,842	15,59,863

Note.—The above figures do not include schemes financed by the Imperial Council of Agricultural Research and the Indian Central Cotton Committee and expenditure on Stores in England.

The excess expenditure in 1933-34 as compared with that of 1932-33 is mainly due to the restoration of the emergency cut in salaries of the provincial and subordinate services.

As regards the decrease under receipts, this is due to the general trade depression and low prices of produce.

X.—PROGRAMME OF WORK FOR 1934-35.

54. The main lines of work are indicated below :—

(1) *Research.*

A.—Research Stations.

(1) *Botany.*—Programme of work as outlined in last year will be continued. Investigation of spike disease on sandal will not be continued for want of time and facilities. Studies on *Colletotrichum* sp. from Safflower and *Vermicularia capsici* will be continued

with special reference to pH value of the media and its influence on the formation and size of spores and acervuli. Studies on the viability of seeds and pollen grains of different varieties of banana will be taken up.

(2) *Chemistry*.—In addition to analytical and advisory work, the following problems will receive special attention:—

Soil Science. Study of soil exhaustion, soil recuperation, soil moisture, soil nitrogen and its fixation by micro-organisms independently and in symbiosis, nature, origin and removal of soil alkalinity. Examination of the methods of estimating the pH values of soils.

Manures and Plant Nutrition.—Studies of the agencies responsible for the loss in the soil of added nitrogen in the form of fertilizers; study of the proper ratios in which nitrogen, phosphate and potash are required by different soils and different crops; utilization of nightsoil by activated sludge process and poudrette. Investigation into use of indigenous and artificial fertilizers.

Animal Nutrition.—Investigation in the food values of agricultural produce to human beings, and farm animals. Determination of digestibility of different roughages and concentrates, manuring in relation to the nutritive value of crop.

Bacteriological.—Investigation into the possibilities of extracting oil from oil seeds by bacterial and enzymic process. Investigation into the possibilities of preparing industrial alcohol from such materials as groundnut husk.

General.—Analysis of insecticides and fungicides; investigation into the causes that affect the colour and keeping quality of jaggery, curing of ginger. Investigation on vegetable oils for illuminating purposes, accelerating the process of dyeing with natural indigo, the preparation of plantain figs, the prevention of loss of cashewnut oil in the process of roasting, sugar production of palmyra palms, the sugar content of different varieties of sugarcane, and the causes that affect the sugar content, the disposal and utilization of domestic waste particularly sewage and night-soil, the industrial and commercial utilization of agricultural produce and its waste products and the utilization of molasses.

(3) *Crops*—(a) *Millet*s.—Continuance of study of mode of inheritance of characters in millets and varietal survey of the sorghums; single plant selections of sorghum, *setaria* and *coracana*; experiments on dry farming in relation to millets.

Korra.—Improvement of yield, and selection of good yielding strains for different tracts.

(b) *Paddy*.—Maintenance of purity of strains already released; trials of progenies of promising hybrids; breeding for disease

resistance; study of inherent qualitative and quantitative characters; chromosome studies of the cultivated and wild rices and their bearing on the occurrence of spikelet sterility; histological studies of the nutritive value of grains; cultural, varietal and manurial experiments.

(c) *Cotton*.—Study of the inheritance of seed and lint weights and of jassid resistance in Cambodia; study of the physiology of drought resistance, yield and rotation experiments, isolation of strains suitable to different tracts.

Investigation into the problem of (a) undeveloped ovules, (b) production of long bracts, (c) presence of fuzz, (d) the control of stem weevil and boll worms, (e) reduction in bud and boll shedding, (f) utilization of the empty pericarps, and (g) utilization of cotton stems.

(d) *Oil Seeds*.—Cultural and varietal trials of groundnut; manurial trials and self-fertilization of heavy yielders; study of coconut pollen, varietal trials of castor for seed and for leaf for eri silk culture; varietal trials of gingelly; study of seedlings of cashewnuts to select desirable types; crossing of soya beans with local beans and pulses.

(e) *Pulses*.—Soya beans and cluster beans. Hybridization with other pulses with a view to the introduction of the oil of the former and the prolificness of the latter into other pulses. Study of variations in lablab and horsegram and selection work on redgram and bengalgram.

(f) *Fruits*.—"Budding" of citrus having proved unsuccessful, grafting by "approach" will be tried. Propagation of the mangosteen by grafting to seedlings of an indigenous species. Grafting on to Avocada pears new and rare varieties of the same species. Raising of new strains and varieties of various ornamental plants by cross pollination.

(g) *Sugarcane*.—Experiments to determine all the possible seasons in the year when sugarcane can be grown. Trials of medium canes and sorghum-sugarcane hybrids; cultural experiments. Investigation into the fundamentals of cane nutrition, and in the optimum manurial requirements of Co. 218 and other promising selections.

(4) *Entomology*.—Continuance of apicultural work, study of specific problems in circles by assistants stationed there, economic work such as testing different kinds of insecticides against various kinds of pests including pests of stored products.

(5) *Implements*.—Experimentation with groundnut decorticators, experiments with ovens for drying grain in Malabar, experiments with the Fal-Kamesam Arsenic treatment of timber and fence posts, trial of Chattanooga subsoil ploughs. Trials of sugarcane crushing mills, power and bullock driven. Trials of sugar centrifugals of different makes, trials with pneumatic tyred bullock carts and with Cooper Persian wheel water lifts.

Irrigation.—Study of the water requirements of crops with V notches at Agricultural Research Stations wherever there are facilities.

(6) **Livestock.**—Increased provision of breeding bulls through district boards as well as other agencies.

Scindhe herds.—Building a herd of good milkers and breeding bulls.

Cross breds.—Breeding back of the cross breds with pure Scindhe bulls.

Kaṅgayams.—Building a herd of cows which will breed regularly and true to type. Milk recording of this herd will continue. Distribution of breeding bulls in Coimbatore and Madura districts.

Alambadis.—Formation of a nucleus herd of this breed with the intention of supplying breeding bulls suitable for Salem, Chittoor and Anantapur districts.

Sheep.—Evolving a pure white strain of Bellery sheep; crossing white-black faced sheep with Bikanir breed.

Poultry.—Maintenance of pens of various breeds.—Imported and country.

Facilities will be given for the training of students and others in cattle management, dairying and poultry farming.

(7) **Mycology.**—Investigation of food-rot of paddy, blast of paddy, false smut of paddy, pollu of pepper, wilt in betel-vine, diseases of redgram and bengalgram, mosaic of sugarcane, shoot-rot of coconut, die-back of cashewnut, diseases of citrus, clump and wilt diseases of groundnut, yellowing disease of cholam and panama disease of plantains; study of promising indigenous drugs with a view to their application as fungicides and spreaders.

B.—Agricultural Research Stations.

Anakapalle—Varietal study of sugarcane.—Behaviour of sorghum hybrids under restricted manurial and irrigated conditions; monthwar planting of sugarcane; trials to investigate the optimum manurial requirements of different sugarcane varieties; manurial experiments with molasses; cultural methods regarding seasonal irrigation to find out the effect on the maturity of cane; trial of seedlings of different ages; trial of varieties under swamp conditions; ratooning, propping and wrapping, seed-rate experiment to find out the most economic rate; manufacture of good quality sugar; preparation of sugar with centrifugals by the open pan system.

Paddy.—Work will be continued on the same lines as in last year. Work on other crops on the same lines as in last year.

Samalkota—Sugarcane.—Study and yield trials of Coimbatore seedlings, sorghum hybrids and other varieties; manurial experiments to find out nitrogen requirements of different varieties;

manurial experiments with molasses; cultural studies—study on the ripening of canes, preparation of jaggery on improved lines and sugar-making by open pan system.

Paddy.—Same programme as in last year.

Plantains.—Study of varieties, effect of combined manures with reference to yield and taste, attempts at hybridization and preparation of plantain figs.

Other crops.—Special attention will be given to the growing of Cambodia cotton, introduction of arrow-root and manilla hemp.

Side lines.—Poultry, bee-keeping, sericulture and pisciculture.

Guntur—Cotton.—Selection work.—Time of sowing experiments, Agronomical work, rotation experiments.

Tobacco.—Selection work, row yield trials, flue curing trials, manurial experiments with cattle manure and artificials in rotation with chillies and variga, varietal trial—local and Virginian.

Chillies.—Study of thrip resisting varieties, thrip control experiment with insecticides, hybridization to introduce hairiness and improve qualities.

Other crops.—Selection work and grading experiments on variga, jonna, maize and sajja. Trials with groundnut, castor, bengalgram, coriander and gingelly, sugarcane and sorghum hybrids, and soya bean varieties.

General.—Poudrette preparation.

Nandyal and Hagari—Hagari.—Work on the same lines as in last year will continue. But with the advent of dry farming scheme, intensive study on the cultural and manurial problems in their relation to soil moisture and nitrogen and study on the physiology of cotton and cholam plants in their relation to the quantity of water absorbed and lost in the course of the season will be undertaken. Other items are—

- Seed improvement of the main crops, viz., cotton, cholam, Italian millet and ragi, and wheat, propagation of new varieties of sugarcane, planting of fruit trees including fig, citrus, sapodilla, zizyphus and mango, keeping a colony of bees and manufacture of composts.

Nandyal.—Improvement of seed of the main crops; manurial experiments on the main crops; growing and use of green manure on somewhat new lines as an indirect method of tackling the soil moisture problem, extension of work in the manufacture of compost and the Indore method of breaking down waste material under rainfall conditions.

Palur—Sugarcane.—Varietal trials, growing of new thick cane varieties, Co. 402 and Co. 363; raising of thick and thin canes in small plots; raising of sorghum crosses; growing of Co. 213, Co. 214 and Co. 285 in wet lands under swampy conditions; manurial experiments to study the effect of nitrate of soda and superphosphate in conjunction with oil-cake.

Paddy.—Selection work on kar paddy varieties, seevān samba and chinna samba.

Other crops.—Study of water requirement of well-irrigated crops like groundnut, sugarcane and paddy; comparison of ragi E.C. 593 with local perum ragi; trials of A.H. 25 and A.H. 12 groundnuts, gingelly and castor varieties.

Aduturai.—Distribution of bulk seed of the strains already released in paddy; strip trials of strains of kuruvai and samba varieties.

Other crops.—Growing of green manure crops, trial of soya beans on field scale, trials with groundnut, maize and cholam, seasonal planting of cholam, hybrid canes and other Coimbatore canes, trial of Co. 213 under restricted irrigation with other canes for comparison and study of vegetables.

General.—Breeding of fish in paddy fields, grading of country birds (poultry) in addition to breeding of pure breeds.

Koalpatti.—Evolving of new strains of cotton; manurial experiments; comparison of seed from season and summer picking; root pruning trials, trial with Egyptian cotton; selection work on different varieties of cholam and cumbu; study on the harmful effects of fodder cholam on the following cotton, manurial trials with chillies, selection in cowpea, trials with soya beans and tomatoes, Indore method of making compost of cotton stalks and other organic farm refuse.

Taliparamba.—Investigations into the manurial requirements of pepper; trial of new varieties of thick canes from Coimbatore and sorghum hybrid canes; trial of African varieties of sorghum, and pumpkin varieties, growing of important varieties of plantains, mangoes and pine-apple.

Nanjanad.—Study on the behaviour of improved varieties of potatoes, wheat and barley, counts of seeds; rates and losses due to diseases; strict selection and germination of setts, experiments with various manure mixtures, so as to develop a mixture with correct proportions of nitrogen, phosphoric acid and potash. Evolution of new varieties of potatoes is undertaken with the grant of the Imperial Council of Agricultural Research.

C.—Trial Plots.

First Circle.—Trial of improved strains of paddy evolved from the Agricultural Research Stations, Anakapalle, as well as Maruteru strains; sugarcane No. Co. 281, M.A. 21, P.O.J. 2878, Co. 210 and sorghum hybrids; improved strains of ragi Nos. 525 and 355.

Second Circle.—Trial of paddy strains evolved at Maruteru and Coimbatore according to different conditions; sugarcane varieties like Co. 213, 281, etc.; sorghum crosses, ragi strain E.C. 593, Pusa wheat Nos. 4 and 111 and Jonna T. 6 and T. 12; trial of strains of Cocanadas cotton evolved at the Agricultural Research Station, Guntur.

Third Circle.—Trial of sugarcane varieties, cotton, cholam, ragi and groundnut.

Fourth Circle.—Trial of improved varieties of paddy, sugarcane and groundnut.

Fifth Circle.—Trial of improved strains of paddy evolved at Aduturai and Coimbatore; Tinnevely cumbu, ragi, Coimbatore sugarcane varieties like Co. 281 and Co. 285.

Sixth Circle.—Trial of paddy strains, specially Adt. 9, Karunganni strains of cotton; ragi strain No. 593, groundnut and sugarcane varieties Co. 213, J. 247 and Fiji B.

Seventh Circle.—Trial of paddy, pepper, sugarcane, sapota, graft mango, pine-apple and cashewnut.

Eighth Circle.—Trial of ragi strain (E.C. 593), cholam (A.S. 1543, 1575, 60, 809 and 29), Jonna strains (T. 1 and T. 12, paddy (Co. strains, Adt. 3, 4), groundnut (A.H. 25 and bunch species), Tenai strain (S. 1. 523), and tobacco (Pusa hybrid No. 177).

(ii) Demonstration.

(1) *Crops.*—Strains of paddy, ragi, sorghum and cotton. Improved varieties of groundnut. Varieties of sugarcane, short planting and line planting of sugarcane; low seed rate for paddy nurseries and clean cultivation.

(2) *Implements.*—Introduction of standard types of ploughs, H.M. guntakas, drill sowing implements and bund formers; improved sugarcane pans.

(3) *Manures.*—Proper methods of preserving cattle manure and manufacture of composts. Preparation of poudrette from night-soil and village rubbish. Introduction of green manure crop for increasing organic matter in both garden and wet lands. Use of oil-cakes and bonemeal for paddy and sugarcane.

(4) *Seed supply.*—Increase of seed in different varieties, especially paddy, cotton, sugarcane, groundnut and green manures.

(5) *Cattle.*—Stationing of stud bulls; advice on proper care of cattle; demonstration of ensilage, fodder crops.

(6) *Jaggery manufacture.*—Preparation of cream jaggery, improved methods of preparing jaggery; manufacture of sugar with centrifugals.

(7) *Insect pests and diseases.*—Advice on proper methods of combating plant pests and diseases; sprayers, insecticides, etc.

(8) *Demonstration plots* in all centre villages in the holdings of ryots under departmental supervision.

(9) *Exhibitions* at important fairs and festivals; motor exhibition vans, lantern lectures.

(10) *Associations.*—Formation of agricultural or co-operative associations to take up stocking and sale of implements, seeds, etc.

(iii) *Agricultural Education.*

Continuance of the Degree course at the College; opening of short courses in agriculture for sons and relations of landlords; facilities for practical training in agriculture at Government farms for educated men who have attained roughly the S.S.L.C. standard; helping in the introduction of courses in agriculture in middle and high schools; continuation of farm labourers' schools.

(iv) *Agricultural Economics.*

Improvement in the marketing of rice, groundnut, cotton and fruit. The appointment of a Marketing Officer and the constitution of a Marketing Board will accelerate improvement in this direction.

(v) *Extension of Agricultural Improvements.*

Provision of pure paddy seed on a large scale; provision of pure cotton seed of Co. 2 (Cambodia) and H. 1 (Hagari) on a large scale; extension of sugarcane area in the Presidency; introduction of Cambodia in new areas; utilization of waste land, spread of agricultural improvements on a mass scale with the help of takavi loans.

I have the honour to be,

Sir,

Your most obedient servant,

S. V. RAMAMURTI,
Director of Agriculture.

GLOSSARY.

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>
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>Capiscum sp.</i>
Coconut	...	...	...	...	<i>Cocos-nucifera.</i>
Cumbu	...	...	...	...	<i>Pennisetum typhoides.</i>
Gingelly	...	...	...	...	<i>Sesamum indicum.</i>
Groundnut	...	...	...	...	<i>Arachis hypogaea.</i>
Grape-vine	...	...	...	...	<i>Citrus decumana.</i>
Horsegram	...	...	...	...	<i>Dolichos biflorus.</i>
Khaki weed	...	...	...	...	<i>Alternanthera echinata.</i>
Kolukattai grass	...	...	...	...	<i>Pennisetum cenchroides.</i>
Korai	...	...	...	...	<i>Cyperus rotundus.</i>
Korra	...	...	...	...	<i>Setaria italica.</i>
Maize	...	...	...	...	<i>Zea mays.</i>
Mangoes	...	...	...	...	<i>Mangifera indica.</i>
Onion	...	...	...	...	<i>Allium sativum.</i>
Orange	...	...	...	...	<i>Citrus aurantium.</i>
Paddy	...	...	...	...	<i>Oryza sativa.</i>
Pani varagu	...	...	...	...	<i>Panicum miliaceum.</i>
Pepper	...	...	...	...	<i>Piper nigrum.</i>
Peach	...	...	...	...	<i>Persica vulgaris.</i>
Pillipesara	...	...	...	...	<i>Phaseolus trilobus, Ait.</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>
Red gram	...	...	...	...	<i>Cajanus indicus.</i>
Samai	...	...	...	...	<i>Panicum miliare.</i>
Soya bean	...	...	...	...	<i>Glycine soja.</i>
Sugarcane	...	...	...	...	<i>Saccharum officinarum.</i>
Teosinte	...	...	...	...	<i>Euchlaena mexicana—schrad.</i>
Tobacco	...	...	...	...	<i>Nicotiana tabacum.</i>
Tung	...	...	...	...	<i>Aleurities fordii.</i>
Turmeric	...	...	...	...	<i>Curcuma longa.</i>
Varagu	...	...	...	...	<i>Paspalum scrobiculatum.</i>
Wheat	...	...	...	...	<i>Triticum spp.</i>
Yerba Mate (Paraguay tea)	...	...	...	...	<i>Ilex paraguayensis.</i>

Government of Madras

DEVELOPMENT DEPARTMENT

G.O. No. 1265, 5th September 1934

Agriculture—Administration Report—1933-34—Recorded with remarks.

READ—the following paper—

From the Director of Agriculture, dated 27th July 1934,
R.O.C. No. D-68/Pdl./34.

Order—No. 1265, Development, dated 5th September 1934.

Recorded.

2. There was a further fall in the number of applications received during the year for admission to the Agricultural College. The final strength of class I consisted only of 40 selected candidates. No student from the Agency tracts obtained admission. The reduced chances in recent years of employment under Government for graduates in Agriculture may have accounted for this decreasing demand for agricultural education. If that is so, it is a matter for regret that the true object of education in agriculture has not been appreciated. The Government wish to emphasize again that the Agricultural College does not exist merely to train persons for service in the Agriculture department. The primary aim is to provide agricultural instruction of a type which will equip the students for the profession of agriculture, and enable them to direct their own labour on their own lands. The college estate comprises over 300 acres and is representative of a variety of soils, black cotton, red soil, loamy soil, garden lands of varying fertility and wet lands; and the college farm exhibits a variety of crops and agricultural conditions. The college gives a thorough practical training suitable for students from all parts of the Presidency and it is hoped that the *raison d'être* of the college particularly in this aspect will be more and more understood and that students who have been trained in modern methods of agriculture will apply the knowledge so acquired to increasing the value of their lands and enhancing their crop returns.

The Government sanctioned the opening at the college of short courses of ten subjects in practical agriculture. It is reported that for want of sufficient accommodation, only one

course on "Farm Management" was started. It is hoped that when the necessary buildings are constructed and accommodation is made available, full courses will be started.

3. Research on crops continued to receive adequate attention. Nearly 600 botanical specimens were identified and the study and survey of plantains, which have come to be more and more recognized in this Presidency as a profitable garden crop, was continued. If it is possible to provide better facilities for the transport of this perishable produce at reasonable rates, it should acquire an extensive market in other parts of India. A noteworthy feature of the work of the Chemistry section during the year is the evolution of a simple process for the production of cream jaggery and white sugar by the open pan method; a few co-operative societies in the Coimbatore and North Arcot districts have carried out tests of this process successfully. Work was also in progress to find out the cheapest method of converting bone into fine bone-meal so that it can be freely adopted in villages, to convert nightsoil into an odourless manure and to explore the possibilities of extending the crushing season of sugarcane by study of the effects of planting and harvesting sugarcane in all months of the year.

Manurial trials have also been continued in relation to crops individually. The results of manurial experiments at Maruteru have established the fact that higher yields can be obtained with artificials in combination with green manure. The continuance of these experiments beyond May 1934 has been sanctioned by Government recently. The Director of Agriculture is requested to indicate the results of these trials in somewhat more detail in the annual administration reports.

Cultural experiments on cotton were continued by the department. Rotation experiments on this crop, experiments in regard to its irrigation, manuring and inter-cultivation have yielded important results. Work on the schemes financed by the Indian Central Cotton Committee on this crop has been continued and a new scheme has been started during the year with the object of evolving annual types suited to the soils where perennial Nadam cotton is now grown. If an annual strain can be evolved, the plant can be pulled up after each year's crop is harvested, and so attack by the cotton stem-weevil prevented. The Director of Agriculture records that, because of the phenomenal fall in the price of paddy, this crop has ceased to pay in several parts of this Presidency; but, although attempts have been made to grow more remunerative crops, rice has perforce to continue to be the important crop in the major part of its present area. It is recognized, that, as there is still no overproduction of rice here, it is necessary to do all that is possible to increase the outturn and reduce the cost of cultivation. The present unfavourable position for rice would seem to have arisen chiefly from the fact that countries in the far east, which did not previously grow sufficient rice for their

own requirements and which were the principal importing areas so far as India was concerned, have of recent years begun to grow more rice themselves. The Local Government appointed in March last a special officer to investigate the condition of rice production and marketing in this Presidency. The data collected by him are expected to indicate the lines on which the internal markets for this produce can be improved. The work of this officer will be followed up by the Provincial Marketing Officer, who has also been appointed recently, in accordance with a scheme for improving the marketing of the principal agricultural crops in India which the Imperial Council of Agricultural Research proposes to finance to a large extent. It is hoped that, as at the present moment the question is of the utmost importance to the ryot, the scheme will achieve substantial results in the improvement of markets, provincial, inter-provincial and external, for the agricultural produce of this Presidency.

4. A series of experiments carried on in respect of agricultural implements have resulted in the design of a Persian wheel water lift of high efficiency.

Intensive studies were carried on in the Entomology section on many crop pests. The work on ericulture was continued. The experiments in progress in the Mycology section include one laid out to determine an effective method of controlling the 'damping off' disease of tobacco seedlings.

In 565 trial plots experiments were conducted on paddy, ragi, sorghum, cotton and groundnut. Some of the strains tested proved distinctly superior to the local varieties. Improved varieties of sugarcane were also tried which established a significant superiority over local strains both in tonnage and in outturn of jaggery.

5. The department continued to conduct demonstrations of improvements in crops, manuring and other cultural operations. The manufacture of jaggery with improved appliances was also demonstrated. The number of demonstration plots however decreased from 2,733 last year to 1,746. It is noteworthy that the area under improved seed recommended by the department has increased considerably during the year. The total area under improved methods of planting paddy and economizing seed is estimated to be 950,000 acres. An increased quantity of seed of improved strains has also been distributed of sugarcane, cotton, and groundnut,—remarkable progress having been made in the distribution of improved strains of paddy to the extent of 1,677 tons against 280 tons last year. In the distribution of improved strains of seed, co-operative societies were, as usual, of much assistance to ryots, especially in respect of paddy, green manure and cotton. Co-operative societies in the Presidency were also helpful in marketing agricultural produce. Jaggery at Anakapalle, groundnut in the North and South Arcot districts, cotton in Tinnevely, and Madura was marketed through these agencies, and a co-operative

society for the benefit of pepper growers was also started at Taliparamba. But there is still a great deal of scope for the extension of those sources.

6. In view of the importance of substituting other crops for paddy at the present moment, it is encouraging to note that the cultivation of sugarcane and fruit has made much headway during the year. The increase in area under sugarcane is marked in Ganjam, Vizagapatam and Kistna districts, especially in localities where sugar factories have sprung up or where there is a prospect of their establishment. The area under fruit gardens in the IInd circle and that of plantains in the I circle was nearly doubled during the year while fresh areas were brought under plantation in other circles.

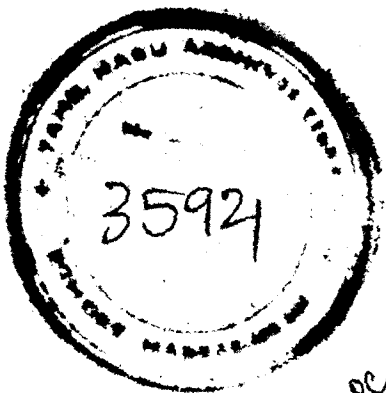
(By order of the Government, Ministry of Public Works)

C. A. HENDERSON,
Secretary to Government.

To the Director of Agriculture.
 " Director of Veterinary Services.
 " Registrar of Co-operative Societies.
 " Law (Education) Department.
 " Public Works and Labour Department.
 " Public Department.
 " Finance Department.
 " Accountant-General.
 " Government of India, Department of Education, Health and Lands
 (with C.L.).
 Press.

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