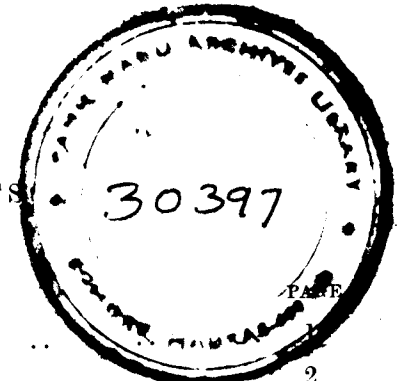


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R.O.C. No. D. 68-Pdl./32.

OFFICE OF THE DIRECTOR OF AGRICULTURE

Madras, dated the 10th August 1933.

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 1932-33.

I.—ADMINISTRATION.

2. I continued to be in charge of the Department throughout the year.

3. *Indian Agricultural Service.*—M.R.Ry. Rao Bahadur D. Ananda Rao and Mr. R. C. Broadfoot were promoted to the selection grade with effect from 9th September 1931 and 7th October 1932, respectively. The lien of Mr. Saadat-ul-lah Khan whose services had been lent to Government of India was suspended with effect from 15th August 1932. Messrs. R. C. Broadfoot and A. C. Edmonds who were on leave out of India at the beginning of the year returned to duty and were posted to the VI and III circles respectively.

4. *Madras Agricultural Service.*—M.R.Ry. Rao Sahib T. V. Rajagopalacharya, Vice-Principal, Agricultural College, Coimbatore, retired from service from 15th June 1932. I regret to record the sudden and untimely demise of M. Kunhambu Nambiyar, Assistant Director of Agriculture, Madura, on 6th December 1932 from smallpox.

The loan of services of Rao Sahib Y. Ramachandra Rao to the Government of India for appointment as Locust Entomologist was extended for one year up to the end of 31st March 1934.

5. *Madras Agricultural Subordinate Service*.—There were no additions to this service during the year. Consequent on the taking up of certain schemes financed by the Indian Central Cotton Committee and the Imperial Council of Agricultural Research during the year, officers already in service were temporarily lent to those bodies and vacancies caused thereby were filled by fresh recruits.

6. *Retrenchment*.—In addition to the 15 posts already retrenched, to which reference was made last year, the following posts were retrenched :—

(i) *Madras Agricultural Service*.—

- (1) Two posts of Assistant Directors of Agriculture.
- (2) Personal Assistant to the Director of Agriculture.
- (3) Statistical Assistant to the Director of Agriculture.
- (4) Personal Assistant to the Principal (temporary).
- (5) Superintendent, Livestock Research Station, Chintaldevi.

(ii) *Madras Agricultural Subordinate Service*.—

- | | |
|---|--|
| (1) One Upper Subordinate of Livestock Section. | |
| (2) Two clerks | } Assistant Director of Agriculture's staff. |
| (3) Four peons | |
| (4) One non-Technical Teacher | } Middle School, Taliparamba. |
| (5) One peon | |

The full effect of retrenchment has resulted in the loss to the Department of eight gazetted officers, 24 Upper and Lower Subordinates, eight clerks, etc., and 17 menials, which is a big toll on a young department such as this.

II.—AGRICULTURAL EDUCATION.

7. The Middle School at Taliparamba was abolished at the end of April 1932 at the termination of the school session and the staff attached was retrenched. The activities of the Department in regard to Agricultural Education otherwise continued as before.

8. *Agricultural College, Coimbatore*.—The number of applicants to the College dropped from 321 to 180. Of this, only 125 appeared before the Selection Committee of whom 48 were selected. The same members of the Selection Committee as last year continued this year. The strength of Class I at the end of the year stood at 45, including an Agency scholarship holder.

The syllabus and revised University Regulations for the B.Sc., Ag., degree course were brought into force with effect from July 1932.

The tuition and lodging fees for the students recently introduced by Government were levied on the students with effect from July 1932.

Examinations.—Forty-eight appeared for B.Sc., Ag., Part I, and 40 came out successful, two failed completely and six in one subject.

For B.Sc., Ag., Part II, 59 were sent up and 54 qualified themselves for the degree.

Scholarships and Prizes.—As a measure of retrenchment the amount of scholarship was reduced to Rs. 20 from Rs. 25 and the award of scholarship was confined from the beginning of the academic year only to two students of the Moslem community and three of the depressed classes, including backward communities. During the year two scholarships were held by the Moslem and backward classes and the special agency scholarship was awarded to a student of the locality. Prizes and medals were presented to successful candidates in the University examination on 18th March 1933 under the presidentship of Sir T. Vijayaraghava Acharya, K.B.E., Vice-President of the Imperial Council of Agricultural Research.

Tours.—In addition to the weekly day excursions, the third-year students had one long tour in the Tamil districts. This class also toured in the Nilgiris for the study of fruit cultivation. Class II went on a tour to III Circle, Bangalore and Hosur.

Library.—With the special grant of Rs. 1,500 sanctioned by Government during the year, 166 books were purchased and added to the Students' Library in the Freeman Building. About 2,521 books and periodicals were received, irrespective of the number of periodicals received in exchange.

Dairy.—At the beginning of the year, there were on an average 33.6 cows in the herd of which 24.4 were in milk as against 32.4 and 27.4, respectively, in the previous year. The decrease in the percentage of milch cows this year was due to the transfer of 12 milking cows from Hosur as against the transfer of 26 milch cows in 1931–32 and increase in the case of dry cows due to transfer of 10 dry cows to Hosur as against 23 dry cows in 1931–32 and also to some of the cows proving unthrifty and drying off long before the usual time.

The total milk yield recorded during the year—excluding blood-stained milk and colostrum which is not saleable—was 140,114 lb. as against 158,933 lb. in 1931–32. This decrease is due to fewer cows milking this year. The daily average yield of milk per cow was 15.65 lb. as against 15.9 lb. in the previous year. The fall is attributable to the prevalence of foot and mouth disease for 2½ months in the year, and the presence of cows in advanced lactation.

Out of the total yield of 140,114 lb. milk during the year, only 123,876 lb. were available for sale after feeding the calves (weaned) with 15,047 lb., viz., 50,410 lb. to the estate residents and 28,666½ lb. to the college hostel. The demand from the estate was steady.

but that from the hostel and for instructional purposes was not. Cows are maintained for all the 12 months in the year, while the students' hostel and instruction need milk only for eight months when the College is in session and this upsets any arrangement for securing economy. The milk available during this period of four months cannot be disposed of readily as milk or as butter, since no corresponding supply can be assured to customers for the rest of the year.

The balance of whole milk, viz. 44,968 lb., left over after the sales noted above, was separated and it yielded 4,433.2 lb. of cream, which together with 263 lb. of cream purchased from outside amounted to 4,696 lb. Of this, 53.6 lb. of cream was sold and the rest converted into 2,515.6 lb. butter. This quantity was disposed of as below :—

	LB.
(a) Sold as butter	1,480.1
(b) Used for buttering the teats while milking	45.3
(c) Used for demonstrating to students the manufacture of ghee	43.0
(d) Converted into ghee for want of sales of butter	947.6
Total ..	2,516.0

The last item accrued when the College was not in session.

The cost of production of milk per lb. works out roughly to 6 pies while the rate at which it is sold is 18 pies per lb. which is thrice the price of production. It may therefore be argued that apart from the overhead charges there is no loss from production of milk. Loss arises only from the conversion of definite quantities of milk, i.e., 60 lb. a day into butter for instructional purposes and from there being little or no sale for milk or butter for 4 months when the College is not in session.

The receipts during the year amounted to Rs. 12,600 as against the expenditure of Rs. 21,774, thus resulting in a net loss of Rs. 9,174 excluding about Rs. 21 worth of stock in hand at the end of the year.

The question of the strength of the herd is under the consideration of the Government.

9. *Conference*.—Owing to financial stringency, the College Day and Conference were postponed to the next year.

10. *Agricultural Middle Schools*.—The middle school at Taliparamba was abolished in April 1932 and the school at Kalahasti could not be opened during the year.

The Agricultural middle school at Usilampatti, maintained by the Madura District Board, had a marked increase in the number of students under training. There were 38 students out of whom 20 were Kallars and 18 of non-Kallar castes.

11. *Farm Labourers' Schools*.—The three schools at Anakapalle, Coimbatore and Palur were continued during the year under report. At Anakapalle there were 32 boys for study as against 39 in the previous year in the day school and 20 adult labourers regularly attended the night school. At Palur the school for labourers' children and the night school for adults worked satisfactorily. At Coimbatore there were 10 boys in the day school and 10 adults in the night school, and the strength rose to 28 pupils—excluding nine farm boys at the end of the year.

The vocational school at Muthanendal maintained by the Ramnad District Board introduced agriculture in its curriculum and an Agricultural Diplomat was added to the staff.

12. *Practical Training in Agriculture*.—At Anakapalle there were at the beginning of the year eight boys under training, out of whom two have been entertained as demonstration coolies, one entered the Agricultural College and the rest went back to the land. There were at the end of the year seven literate boys for this course of study. At Samalkota, three men received training while one maistri from Guntur was given special training in jaggery-making.

Post-graduate Research.—A new feature of the educational activities of the Department is the encouragement of research by the members of the staff for post graduate degrees, under the guidance and supervision of Experts. In Chemistry, M.R.Ry. C. Narasimhachari, Assistant Lecturer in Chemistry, was awarded the M.Sc. Degree of the Madras University for his thesis on the "Diastasic Enzymes of Cholan Malt." M.R.Ry. P. Satyanarayana, Assistant in Chemistry, has also been awarded the M.Sc. degree for his thesis on "The Chemistry of Bordeaux Mixture."

The Madras University has declared B.Sc. Ag.'s of the College to be eligible for M.Sc. Degree. Three have joined the Chemist's section as the first set of post-graduate students.

A Research scholar of the Madras University is engaged at the Coconut stations at Kasaragod on the morphological characters which affect the yield of coconuts.

III.—SEASON.

13. A depression formed off the Malabar Coast during the third week in May ushered a temporary advance of the monsoon resulting in heavy rainfall. After the 26th of May, the monsoon current began to retreat and in so doing very rough seas and gales were experienced along the west coast accompanied by heavy rain doing

considerable damage to railway and telegraph lines and to property in general in that area. The monsoon was weak in June, while it somewhat strengthened in July and August and the September rains were on the whole adequate though below normal. The total rainfall of the south-west monsoon was less than the average in all the districts except Bellary, Coimbatore, Trichinopoly, Madura, Ramnad and Tinnevely.

A depression in the south-west of the Bay between the 9th and 12th October caused fairly widespread rain. Another depression formed off the Coromandel coast on the 30th October caused widespread rain in south and north Madras in the first week of November. On the 22nd of November, a depression in the south of the Bay intensified into a storm and was responsible for general and local heavy rain on the Coromandel coast and in south Madras. Rainfall also extended into the north Madras coast and south Deccan. These heavy rains caused breaches in irrigation sources in parts of Tanjore district. In December the rainfall was below average except in parts of the central and southern districts. The north-east monsoon on the whole was above average except in Kurnool, Cuddapah, Nellore and Chittoor.

The effect of the season on the crops at the various agricultural stations is described below.

The south-west monsoon adversely affected the yield of paddy at the Agricultural Research station, Berhampur. Owing to the drought that prevailed during the latter part of the year, sugarcane and sunnhemp at the Anakapalle station had to be irrigated by lift irrigation. At Samalkota, sugarcane, plantain, garden and dry crops were benefited by the south-west monsoon and crops yielded above the average. Owing to the bad distribution of the rainfall, paddy at the Agricultural Research Station, Maruteru, yielded much less than normal. In Guntur, adverse season during the north-east monsoon affected crops in the later stages. At the Agricultural Research station, Hagari, seasonal conditions were favourable for cotton but owing to too much moisture in early stages the crop was subjected to fungus and insect attacks; while at Nandyal the season was unfavourable to groundnut, chillies, fodder and green manure crops.

At the Agricultural Research station, Palur, dry crops suffered from drought during the south-west monsoon period while heavy rains during the north-east monsoon lodged the sugarcane thrice; at Palakuppam, a similar season was experienced where castor was lodged during the north-east rains. The season was, however, favourable for paddy at the Agricultural Research station, Aduurai. At Kovilpatti, the season was favourable for cotton, fodder, cholam and pulses generally, while at Taliparamba it was favourable for dry crops, coconut, sugarcane, fair to paddy and prejudicial to pepper. At Coimbatore, though the rainfall on the whole was

evenly distributed, it was unfavourable to cholam and certain types of cotton. At Nanjanad, the heavy rains in October retarded the growth of the second crop of potatoes.

IV.—RESEARCH.

14. As has been expressed in previous reports research is the basis of all agricultural improvement. Without it there can be no real improvement in Agriculture. Much attention was, therefore, paid this year to research as may be seen from the following paragraphs.

A.—Botany.

15. Owing to the abolition of the post of the Systematic Botanist, the work of the section was necessarily cut down, the only assistant in charge doing as much as was possible in the circumstances. Over nine hundred botanical specimens were identified for the Herbarium and for various correspondents—officers of the Forest Department and of the local Agricultural Department and the Superintendent, Pasteur Institute, Coonoor; 2,090 sheets were incorporated into the Herbarium. Two thousand and eighty specimens were poisoned and 2,070 specimens were mounted. Under the item of loan and exchange of specimen plants, 19 sheets of *arisæma* (*aroidæ*) lent to Kew were received back. At the instance of the Professor of Botany, Maharaja's College of Science, Trivandrum, 70 representative duplicate grasses of South India were presented to the Herbarium at the Smithsonian Institute, Washington, United States of America. Three hundred and fifty four specimens of African grasses, Singapore and North Indian plants were received from the Forest Botanists of Dehra Dun and Union of South Africa, Pretoria and 136 duplicates of South Indian species were sent to them in exchange.

Under economic work may be mentioned the study of indigenous fodder grasses suited to South Indian pastures which were planted for the purpose both in the Botanic Garden and in the Central Farm. Some interesting results have been obtained. Another interesting experiment that is being conducted by this section is in connexion with the eradication of Khaki weed (*alternanthera echinata*) and nut grass (*cyperus rotundus*). Sodium arsenate (of 4½ per cent strength) at 300 lb. per acre was found to kill the Khaki weed in three days. Two or three ploughings at intervals with a mould-board plough were effective in exterminating it on arable land. But these methods are not effective in destroying the vitality of the seed buried in the soil. Methods to eradicate nut grass are in progress. The study and survey of bananas and plantains were continued this year also.

B.—Chemistry.

16. The Chemistry section is the largest at the Research Institute and is equipped with five gazetted assistants besides a large

number of subordinate staff. The work of this section may be divided into two main categories, (1) advisory and (2) research.

As regards item (1), 837 samples consisting of soils, manures, fertilizers, feeding stuffs, fodders, plants, grains, straws, sugarcane, oil seeds, insecticides and fungicides were analysed. The realization of Rs. 883 as fees for analyses as against Rs. 250 last year shows the popularity of this section. Besides helping the officers of this department, other departments such as the Industries, Jail, Fisheries and Public Health were also assisted.

(2) *Soil Characteristics*.—A systematic study of soils for their characteristics was in progress during the year. The object of such a study is to obtain precise information from the behaviour of soils towards varying cultural and manurial practices and to enable the chemist to advise the agriculturist on problems of soil fertility. From the available data on the analysis of clays it would appear that black soils are characterized by a high content of total silica (50–54 per cent) and lime and magnesia (5–7 per cent), and low iron and alumina (28 per cent). The red soils are relatively poor in silica (45 per cent), very poor in lime and magnesia (0.6 per cent) and richer in iron and alumina (41 per cent).

Besides this, work on base exchange, conductivity of soil extracts, soil reaction and buffer values of aqueous soil extracts and soil moisture experiments are in progress.

The study on soil nitrogen requires special mention. From a practical point of view, the results so far obtained indicate that an adequate supply of organic matter in the soil is a very important factor in maintaining the nitrogen status of the soil and in controlling loss of nitrogen. This affords independent evidence that the first requirement is organic matter for our soils.

With the recognition of the fundamental importance of organic manures to Indian Agriculture, special attention was paid to waste organic vegetation and farm refuse and to composting them as manure for crops. The litter of the eri silk worm which is a by-product in silk worm industry has thus received attention. On the basis of Nitrogen analysis, it was found to be as good as castor cake and from actual field experiments its original and residual manurial values were found to be even superior to groundnut cake as a manure for ragi. The study of the utilization of nightsoil as manure was continued. Using nightsoil and village rubbish in equal quantities and very small quantities of either copper sulphate or common salt in solution, it was possible to eliminate offensive smell during fermentation and to produce a manure without smell but with a high nitrogen content and manurial value. Experiments on making poudrette was conducted at Anakapalle in conjunction with the Public Health Department.

The Study on the influence of manuring on the quality of the crop.—This line of work which is of fundamental importance to agricultural wealth and national vitality was initiated in this Laboratory and is being confirmed elsewhere. The results confirmed the previous findings and showed that grain raised with cattle manure or oil cakes possessed better nutritive value for rats than grain raised with chemical manures or no manure at all. Cumbu grain fed at 2 per cent of the weight of the animal, was found to be incapable of protecting the animals from diseases arising out of vitamin deficiency. In another experiment using Eri silk worms for test, castor leaf from plants raised with cattle manure contributed to the better growth of the worms and to greater cocoon weight than those of the worms fed on castor foliage of plants manured with artificial fertilizers or not manured at all.

C.—(1) *Crops*.

17. (a) *Millets*.—In a Presidency as large as Madras with its varying conditions of soil and climate it is but necessary that the improved strains evolved at Coimbatore should first be thoroughly tested under ryots' conditions in the tract where they are to be introduced on a field scale. Sub-stations are therefore essential but for the sake of economy, arrangements have been made to carry on the tests on the existing farms by assistants specially trained by the Millet Specialist. Last year's trained assistants were sent one to each of the Research stations at Hagari and Nandyal to be under the control of the Deputy Director of Agriculture and this year similar work was started at Guntur and Koilpatti. These four stations being in the midst of important millet growing tracts this arrangement completes the equipment of the circle officers with trained assistants to tackle local economic millet problems in their research stations.

Economic Work—(i) *Sorghum*.—At the Millet breeding station, 950 units of this important millet were handled for economic as well as scientific studies. Three series of comparative trials were laid one for the yellow and two for the white varieties. In the yellows, strain A. 5809 was good for a second time and in the whites A.S. 1575 proved superior for a second time. These are being tested in ryots' fields under ryots' conditions. Comparative trials of strains suitable for the summer and of mixture of strains suitable for the main season are in progress. Strain A. 560 continues to be the best *Periya Manjal* strain. Over 850 lb. of this were distributed during the year. Of the four varieties of sorghum compared for fodder value the dull mid-ribbed sweet stalked one was found superior. The sorghum yield trials at Hagari have not given any encouraging results for the second time. Fresh material was gathered from 10 different places and 48 early promising selections were made. At Nandyal three strains gave as high a yield as No. 23/10 and much higher yields than T-6, the present standard. Thirty out of 300 selections tried in row yields gave as good yields

as N. 23/10. Three varieties of African sorghum were under trial at Taliparamba on the west coast. Unfortunately they failed to set grain this year.

At Nandyal in a spacing experiment, spacings of 10½", 16", 20" and 24" between lines were tried with no significant increase in yield. Similarly thinning plants in the rows keeping them 9" and 18" apart gave no difference in the yield of grain. In straw, however, the lower spacings gave a significantly higher yield. A comparative trial of ploughing as compared with harrowing resulted in an increase of 80 lb. of grain per acre in favour of the former. In a spacing trial at Hagari out of five spacings, 27" and 15" spacings gave a higher yield as compared with the normal 13½" spacing. Fifteen inches spacing gave a higher yield of fodder while the plants in the 27" spacing produced a distinctly bolder grain.

At Nandyal the application of artificials to sorghum gave an increased yield of 300 lb. of grain and 500 lb. of straw. On cotton which followed it, the manure had a residual effect which gave a 50 lb. increase per acre while in the following crop of sorghum an increase of 140 lb. of grain and 400 lb. of straw was noticed.

(ii) *Ragi* (*Eleusine coracana*).—Over 930 units of ragi were under study. Four series of comparative trials were made. E.C. 593 continues to be the best strain. It has passed the stage of trial on the farm and is being tested in the districts. Reports have been received commenting on its superiority from Chittoor, Mannargudi, Koilpatti, Salem and Coimbatore. An increase of 15 per cent in yield may easily be claimed in favour of this strain. E.C. 47, another strain, though longer in duration is finding favour among the ryots of Coimbatore.

At the Agricultural Research Station, Anakapalle, where selection work on ragi has been going on for some years, four selections are of promise.

(iii) *Korra* (*Setaria italica*).—Strain No. S.I. 523 continued to be easily the best. S.I. II was the next best. From both of these strains it can be claimed that they are more than 25 per cent superior to the local mixture. Arrangements have been made with the Deputy Director of Agriculture, VIII Circle, for the distribution of S.I. 523. At Nandyal about 200 selections were in the rows yield stage while during the year fresh selections were made from the local types.

Preliminary work on other millets *cumbu* (*Pennisetum typhodeum*), *arika* (*Paspalum scrobiculatum*), *panivargu* (*Panicum miliacium*) are in progress at the Millets Station at Coimbatore. At Koilpatti, 201 selections were dealt with in *cumbu*, a large number being from the Punjab. Of these, 29 from the Punjab and 10 from local are of promise.

(b) *Paddy*.—Paddy being the staple food of the majority of the population is by far the most important crop in the Presidency.

It is for this reason, plant breeding work was concentrated on this crop from the very beginning. As work progressed and as men were available sub-stations were opened at Aduturai, Maruteru and Pattambi each in charge of a gazetted assistant. Such sub-stations are started by the Paddy Specialist and kept under his control until they are able to cater to the needs of the districts amidst which they are situated when they are transferred to the Deputy Director of the circle concerned. Mention was made in my report for 1931-32 that a Rice Research station was opened at Berhampur—the funds for maintaining the station being furnished by the Imperial Council of Agricultural Research.

As in the past, both economic and agronomic research progressed at all the breeding stations, as well as at the other agricultural stations where paddy is an important crop. Evolution of strains and selection of seed are important items of work of the Paddy stations.

Economic Work.—At Coimbatore, the two *Anaikomban* strains which have been found to give 17 per cent and 12 per cent increased yield for the past five years were tried this year in the Tinnevely district in ryots' land with the result that the better of the two has given a significant increase over the ryots' seed. It has been decided, therefore, to release it for general distribution in the district under the name of Co. 8 during this season. Two more promising strains of the *Samba* varieties—*Sendinayaganu* and *Ayyansamba* and two short duration strains—*Tinnevely kar* and *Gobi kar* are in the trial stage.

At Maruteru over 200 selections from the important Godavari and Kistna varieties were under various stages of trial and 580 progenies of hybrids from local varieties were under observation. Several strains which had been giving distinctly increased yields on the station for a number of years were once again tried in ryots' land in the districts and were found to maintain their superiority in point of yield. It has, therefore, been decided to release eight of these strains to be named M.T.U. 1 to 8 for distribution.

At Aduturai Adt. 10 a strain from *Korangu samba* was released for the first time during the year for distribution to ryots. Two strains Adt. 9 and Adt. 11, the former from "*Poonkar*" and the latter from A.E.B. 65 were in their trial plots during the year. The former gave 30 per cent increase over the unselected bulk. Over 600 fresh selections were made during the year in *kuruwai* and *samba* crops.

At Pattambi, 114 strains were under various stages of yield trials. Of these 14 which have finished their trials on the station giving 10-22 per cent increases over the controls consistently for three years will be tried in the districts under ryots' conditions. Besides these 500 new selections were under observation during the year preliminary to undertaking yield trials.

At Berhampur, bulk selections were made in five of the important local varieties, preliminary to pure line work and as an immediate improvement. Besides this, over 2,000 single plant selections have been made in these various varieties for study. Yield trials with strain G.E.B. 24 has proved that it is as good as *Dyyahunda*, the most important local variety, in yield and better than *Ratnachudi* the next most important variety.

In addition to breeding paddies for disease resistance and collection of varieties from other provinces, inheritance and cytological studies are in progress at Coimbatore.

Agronomic studies—(a) Manurial experiments.—An experiment conducted at Coimbatore, Maruteru and Pattambi for two seasons to determine the optimum time of applying ammonium sulphate to the paddy crop has shown that it is best applied one month after planting at Maruteru and Pattambi and two months after at Coimbatore. Kossier Phosphate as a fertilizer for paddy did not prove superior to bone-meal. The results of the experiment to test the value of intensively manuring of the seed-bed conducted at three stations have proved the greater importance of manuring the transplanted field rather than the seed-bed.

(b) Cultural experiments.—In Coimbatore, with medium and long duration varieties keeping the number of plants per unit area nearly the same, transplanting has given more than 25 per cent increase over broadcasting. In the "age of seedlings" experiment with late varieties at Coimbatore and Berhampur ages from 30 to 60 days from the date of sowing did not show significant differences in yield. Spacing experiments at Berhampur where the soil is inherently poor, close planting of 3"-4" has been found to give the maximum yield. At Samalkota it was found that winter dry ploughing reduced the yield of paddy by 18.5 per cent and summer dry ploughing by 9.2 per cent. It has been proved that under conditions obtaining there dry ploughing of paddy soils has a deleterious effect on the crop. A similar result was obtained at Aduturai, also a station in the deltaic tract.

As expressed in last year's report with the very low price of paddy, other commercial crops like sugarcane, plantain, cambodia, etc., are being tried in rotation with paddy.

(2) Fibres. (Cotton.)

18. The main work of the cotton section both in the central station at Coimbatore and in the sub-stations at Guntur, Nandyal, Hagari and Koilpatti is to produce better strains of cotton suited to different localities both by means of selection and hybridization, the work therefore being both economic and academic. Both irrigated and rain-fed cottons are dealt with.

Economic Work.

(a) Breeding.—A large F. 2 population of crosses between Co. 2 and South African cottons was raised with the object of

selecting heavy bearing and early types which would reduce the number of irrigations given to the crop and would also permit a longer close period being observed in connexion with the control of stem weevil and pink boll worms. Three thousand five hundred and eleven promising plants were selected from garden and dry land. Out of 164 cultures of Cambodia grown for selecting types suitable for rain-fed conditions, 24 showed superiority. Five varieties of Roseum X Indicum crosses and two of Cambodia cotton were under trial at Anakapalle. Among 113 lines of *Nadams* tested with *Karunganni* only six proved to be as early as the standard. In the yield test made with Cambodia strains, it is gratifying to note that for the first time Co. 2 was beaten by three strains, viz., 920, 1267 and 1742. *Karunganni* 546 was again ahead of C. 7. At Koilpatti it has done well in trial plots in ryots' fields.

In Guntur, 300 single plant selections were made from the Cocanadas and Cambodia cotton besides which a large number were under row yield trial. The results are promising.

At Nandyal two strains Nos. 29 and 15 which gave highest yield last year proved to be only equal to N. 14 during the present season. Eight new selections were under trial but owing to an exceptionally poor rainfall no conclusions could safely be drawn.

At Hagari, the improvement of the local "Hingari" cotton by pure line selection was continued. Seven of the eight pure lines among the new selections gave a higher yield than H. 1, the standard cotton but were poor in ginning percentage. It was learnt that the yellow factor in the flower seems to go with small bolls and earliness. Weight of seed in relation to its position in the lock was under study. There does not seem to be any relation between the seed weight and lint weight.

(b) Agronomy—Rotation.—Agronomic studies consisted in finding suitable rotation crops with cotton. Cholan and gumbu are the usual crops. Other crops added to the list are ragi, groundnut and green manure. Sowing cotton in a fallow field was also tried. The results obtained were practically in agreement with those of last year, viz., cotton succeeding cumbu, cholam, ragi, groundnut, fallow and green manure crops gave 490 lb., 505 lb., 555 lb., 650 lb., 662 lb., and 919 lb. per acre respectively. The increase especially in the green manure plot (84 per cent over the cholam plot) was remarkable; but it is rather doubtful if the farmer will grow a green manure crop or leave the land fallow in preference to the growing of summer cholam or cumbu which provides him with grain and his cattle with fodder.

In the manurial experiments at the Cotton Breeding Station with two cwt. of ammonium sulphate and 1 cwt. of super it was found that unlike at Koilpatti, the beneficial effects were not commensurate with the cost of manure in all the three years of their

trial. But the results obtained in the rotation experiments suggest that nitrogen in an organic form will lead to better results. When ammonium sulphate was applied as a top dressing, with a view to increase the retention of buds and bolls, no improvement in yield was perceived.

A new irrigation experiment was initiated during the year at Coimbatore with the idea of determining the influence of irrigation on the humidity around the plant and utilizing the knowledge thus gained in controlling the spread of insect pests. Some interesting data were collected but this will be discussed after another year of experiment on the same subject.

The various types of spacing trials confirm the common opinion that a higher seed rate should be used in fertile soils.

Other Crops.—Redgram and Bengalgram are other crops that received attention in this section. One of the strains of Bengalgram when grown on the Central farm gave 575 lb. per acre when the farm average was only 315 lb. It was also found to be highly wilt resistant.

Schemes financed by the Indian Central Cotton Committee.—(a) *Madras Herbaceum Scheme.*—On the completion of season pickings in the several row tests made last year sixteen lines were found to be superior to C. 7. Nine of these were tried for purity. Only four gave hopes of being heavy bearers. All the progenies of crosses between *Karunganni* and *Uppam* strains proved disappointing. But the lines obtained from X-rayed material and from natural crosses gave very encouraging results.

(b) *Pempheres and Physiological Scheme.*—The investigations made during the year were restricted to the Pempheres problem alone. Some interesting data on the distribution of the insect and on its seasonal and off-seasonal history were collected. The infestation was found to be less in Cambodia grown on rainfed lands. The pest was absent in certain parts of Madura and Ramnad districts. No explanation could be adduced for this interesting phenomenon. In any case climatological differences did not appear to be responsible for this state. For, experiments in closed chambers disclosed that the weevil could withstand all types of humidity from 0 to 100 per cent and that the lethal temperatures were below 0°C. and above 50°C. which are far beyond the normal atmospheric conditions obtained in this Presidency.

Based on the observations made last year on the habits of the insects and on the differences found in the mineral constitution of the attacked and healthy plants a few experiments were conducted to test if any wide fluctuations in the incidence could be artificially induced. It was observed that covering the most susceptible region—the hypocotyl—with earth or spraying repellants or dusting stomach poisons on the stem had not indicated any diminution in the proportion of attacked plants. Stimulating the plants with

the chemical constituents found deficient in introduction of parasites that might attack the grubs was another method tried with no effect. A study of the different varieties of cotton for their susceptibilities in regard to weevil infestation revealed that Kidney and Nigerian cotton alone were found to be completely free. These were crossed with Co. 2 with the hope of evolving a resistant type by hybridisation.

Progenies of plants, found to be free or highly tolerant last year showed that the absence of galls noted on their parents was not entirely due to their inherent resistance. Fresh selections for freedom from galls were again made during the year in Co. 2.

Attempts are being made to replace the short stapled, Verum type of cotton, commonly cultivated in South Kanara and North Malabar as a mixture with dry paddy and Broach cotton.

(3) Fodders.

19. Reference was made last year to the initiation of a study of South Indian grasses. The indigenous grasses suited to local conditions were planted in small plots for a comparative trial. All grew well under irrigation, the three best being *Andropogon annulatus*, *Pennisetum cenchroides*, and *Iseilama laxum*. Teosinte, a fodder grass, was tried at the Central farm, Coimbatore, Hosur and Aduturai. It came up well at the former two places and yielded at 32,000 lb. green fodder per acre at Coimbatore. At Aduturai, *pillipesara* did well giving 22,600 lb. of green fodder per acre in two cuttings. In order to make it popular among ryots, it was sold to them in small quantities but the demand became so great that it was found judicious to reserve whatever was available for the farm herd. Seed of this crop has been collected and distributed to the district staff in the V circle.

At Taliparamba, two silo pits were filled with cholam, cow-gram and hill-grass, the last of which is found in abundance after the south-west monsoon period. The silage was found good and supplied succulent fodder for cattle during the hot months of March and April. Manurial experiments on grasses were continued at the Livestock Research station, Hosur. An experiment to test the effect of the applications of farm yard manure at 10 and 20 cart-loads per acre every year and in alternate years indicated the advantage of applying it at 10 cart loads.

(4) Fruit.

20. Increased attention has been given to fruit during the year. Fruit culture is in progress in almost all the agricultural stations of the province. In the Nilgiris, experiments in grafting and budding apples and plums on to stocks of different genera but of the same natural family were attempted. No success has yet been obtained. The budding experiments on oranges and grape fruit were continued. Various kinds of citrus stocks were used, and grafting was done by various methods and at different seasons

of the year to determine if possible the most suitable stock to use and the best season in which to graft. The propagation of apple stocks was undertaken on the lines practised at East Mallang with considerable success and a large number of stocks was raised by mounding and layering. At Anakapalle observations on the behaviour of different varieties of citrus were continued.

Plantain.—At Samalkota, 17 varieties and sub-varieties were under trial. Seedling plantains were also grown for crossing purposes. A survey and study of the Bananas and plantains of the Presidency was undertaken during the year. Important varieties of plantains grown in Malabar and South Kanara were under trial. Nearly 300 suckers of different varieties were obtained for planting at Coimbatore. Full description of 30 varieties and important morphological characters of 12 varieties were recorded. The study of vegetative and floral characters of the crop is under progress while an analysis of the crop is being done by the Chemist.

Agronomic Studies.—Manurial experiments were laid down at Samalkota and Kallar. Inoculation experiments against plantain Wilt (*Fusarium cubense*) were instituted and the life history of the fungus was studied. An interesting aspect of the work on plantains this year has been the conversion of ripe plantain fruit into what is popularly known as "plantain figs." It has achieved a great success and has created a growing demand. Samples of crystallized plantain figs were also sent to England. There seems to be no demand for the figs there but there might be on the continent.

Coconut.—"Tall" and "Dwarf" types of coconuts were crossed with a view to build up a desirable type of coconut palm. Hybridization was attempted within the selected palms. Experiments were laid down to find out the most economical manures and to test different methods of manurial application. Investigation into the methods of selecting promising coconut seedlings from the nursery was initiated.

Vegetable crosses.—In order to get new types of vegetables, a large number of crosses among various vegetables like tomato, brinjal, chilly, gourd, pumpkin, cucumber, etc., were made. These experiments will be continued next year.

(5) Oil Seeds.

21. In addition to the work on the Agricultural Research stations, Palakuppam, Kasaragod and Nileshwar I to III, preliminary work was carried out on the Central Farm where numerous varieties of groundnut, gingelly and castor were tried out. Cytological investigations were taken up during the year.

- (i) *Groundnut.*—(a) Out of the 25 varieties under comparative trials 10 have yielded significantly better than the local variety. "Saloum" which stood first last year has again topped all the varieties with an increase of 26 per cent

over local mauritius. Arrangements will be made to send this out to districts for trial. About 2,400 new selections were made during the year.

- (b) *Hybridization.*—With a view to evolve high yielding short duration varieties of bunch and spreading groundnut, 1,530 flowers were crossed which yielded 530 pods. Thirty-one F-1's of a cross between Gudiyattam Bunch and Philippine white were studied.

- (c) *Spacing Trials.*—Spacing of 6" × 6" for the bunch variety and 9" × 9" for the spreading proved most economical. The wider-spaced plants produce more of flowers and pods per plant than the closer-spaced ones. There is a slight tendency for the kernels to increase in size with the increased spacing.

- (d) *Pod Formation.*—Out of the total flowering period of about two months the flowers produced in the first month were alone seen to produce mature pods. Generally the later formed flowers are responsible for immature and tender pods. It takes nearly 60 to 100 days from the time of fertilization to the complete development of the pods. The study of oil formation in the kernels is very interesting. The rate of oil formation is rather slow in the earlier stages. The curve of oil formation does not follow a parallel course with that of the transference of the materials from the shell to the kernels. The acid value is high at the time the pods start developing and is very slow in the mature seeds with a rapid fall in its value between 32 and 53 days. The oil is synthesized from the free fatty acid. If the groundnut is harvested a week before the pods are mature, the percentage of oil will be reduced by about four to five and the free fatty acid content will be increased appreciably.

Besides these, studies on the root system of different varieties were in progress.

- (ii) *Gingelly.*—To find out the suitability of the different varieties to different seasons, 54 varieties were sown in these seasons.

- (a) *Varieties.*—"Sattur" and "Anakapalle" varieties were found to be most promising among the short-duration irrigated gingellies. Some of the medium-duration varieties from Malabar are promising.

- (b) *Hybridization and Selection.*—Out of 150 single plant selections about 50 are promising. About 61 fresh selections were made during the year.

- (iii) *Castor.*—Along with study and selection of castor, Eri silk culture was introduced on the farm for the first time this year.

(6) Root Crops.

22. *Potato*.—Investigation on the potato is confined to the Agricultural Research Station, Nanjanad. During the early years when several varieties had been imported into the station, several of them got mixed which has now necessitated purification of stock. Single plant selection work was also undertaken.

The early crop intended for the Annual Flower Show suffered from lack of rains and growth was slow in spite of constant irrigation. The average yield was only 5.36 fold, although King Edward gave as much as 9.70 fold. The main crop, in spite of the fact that it suffered from a virulent attack of *alternaria*, gave an average yield 8.94 fold, which is by far the highest obtained ever since the opening of the station.

The average yield of the second crop was 4.39 fold as against 3.9 of last year, but unlike last year the new seed took longer to germinate. The crop raised by cultivators in this season on the Nilgiris was badly diseased while the farm crops were conspicuous by its absence, as a result of the improved methods in cultivation.

Experiments on different manures, size and spacing, planting cut and whole setts, comparison of new seed with old seed, spraying against *alternaria* were in progress at the station.

The cereal crops like ragi, cumbu, samai, wheat and barley grown in rotation with potato did but fairly during the year. A very good crop of lupin was raised after the main crop of potatoes.

(7) Spices and Condiments.

23. (1) *Pepper*.—This crop is grown in Taliparamba where the season was more favourable for it than last year. The yield obtained during the year was 2,364 lb. as against 715 lb. last year and 6,010 lb. in the year previous to it. Out of 30 acres that are under this crop in that station, only 16 acres are in their prime, the rest being either too young or too old. Manurial experiments on pepper were continued. There are two series, limed and unlimed in each of which nitrogen, phosphorus and potash are applied in different combinations. It is too early to comment on the results so far obtained as there are vines which have not yet begun to bear; but the impression is that the limed series looks better than the unlimed and in the former a larger number of vines have come to bearing. The investigation on "*pollu*" was continued. This year's result shows that the spike fall is mostly due to unfavourable weather conditions. *Pollu* due to insect attack was greater than that due to the fungus.

(2) *Chilly*.—Work on this crop is mainly confined to the Agricultural Research Station, Guntur. The damage due to thrips was not so great this year and an average yield of 738 lb. dry chillies was obtained per acre. Selection work with a view to evolve thrip resistant strains was continued. One hundred and fifty fresh

selections were made this year. Varieties obtained from Pusa, Gollaprolu and Bobbili were resistant to thrips. An experiment devised to control thrips has been in progress during the last five years. It showed that tobacco dust was the most effective of all the insecticides tried. The use of tobacco dust this year has however not resulted in profit. Reference was made last year to the popular belief that growing chillies continuously on the same land without rotation not only increases the yield but also improves the soil fertility. An experiment started last year to test this was continued this year. It was found that the crop was least affected by thrips and a yield of 1,002 lb. was obtained as against 247 lb. last year. In other fields where the crop is grown with other crops in rotation, the yields range between 500 and 600 lb.

(8) Sugarcane (*Sacharum officinarum*).

24. A great stimulus to the cultivation of this crop was given throughout the Presidency, thanks to the duty on sugar. Nearly all the agricultural stations cultivated a large number of varieties of sugarcane. The Agricultural Research Station, Anakapalle, showed the greatest activity in sugarcane research. A varietal study according to manurial and irrigational requirements has indicated that the two best canes were M.A. 21, a seedling cane raised at Anakapalle under liberal manurial and irrigational treatment and Co. 213 under restricted conditions. The latter, a seedling cane from Coimbatore, is being grown elsewhere too as a drought resister and has been the most popular of all.

At Samalkota, 34 new seedling cane varieties have been studied where also Co. 213 is most promising.

At Palur, Anakapalle, Samalkota and one or two other stations, sorghum hybrids were under preliminary trials. While at Anakapalle these seem to take as long as 9 months to mature, at Palur, the same varieties seem to be ready in $7\frac{1}{2}$ months. These crosses have a great future as it would be possible in the same year to raise another crop following sugarcane. In other farms these seem to mature between seven and eight months.

Experiments are also on hand at several stations to find out whether varieties other than sorghum hybrids have more than one ripening season as is known to be the case in a few areas and what are the most suitable months for growing different varieties in different tracts.

Agronomic Studies.—In an irrigation experiment at Anakapalle it has been found that by irrigating only at the time of planting, Co. 213 under February and April planting gave 37 and 52 per cent increase in yield over J. 247, respectively, while in M.A. 21 the increase was 15.5 and 33 per cent respectively. Other experiments at Anakapalle were in regard to spacing, method of planting and wrapping, etc.

At Samalkota, apart from a variety of experiments in progress already, new experiments consisted of (i) shallow trench planting versus bed planting, (ii) treating setts with lime water, tepid water and prolonged soaking in cold water, (iii) planting setts eye to eye and obliquely compared with normal end-to-end planting with a view to test their effect on germination, and (iv) spacing in rows. Manurial experiments were in progress here as well as at Anakapalle and Palur. At the latter station, the experiment has been in progress for the last five years which indicated that Fiji B, the local standard variety, responds most to heavy manuring of 200 lb. nitrogen per acre in the shape of oil cake and ammonium sulphate in the proportion of 3 : 2. It is also found that the application of manuring in three doses is preferable to applying it in single or double doses. The efficacy of ammonium sulphate for cane as compared with groundnut cake when either was tried in conjunction with farm yard and other organic manure was demonstrated at Anakapalle. Ammonium sulphate gave an average net profit of Rs. 63 per acre as against Rs. 22 for groundnut cake during the last four years.

A rotation experiment has been in progress at Palur for the last nine years. The results have shown that it is detrimental to the soil to grow cane in alternate years and that it is more economical to grow it once in three years, while good yields are obtained by growing it once in four years.

Sugar manufacture under ryots' conditions was demonstrated at Anakapalle and Palur with success. Rab was prepared on the Rohilkhand bel, Sindwahe and Godavari furnaces and centrifuged.

D.—Entomology.

25. Among the special investigations on which work was continued during the year may be mentioned the paddy stem-borer, the rice grasshopper, coconut beetles, thrips on chillies, hairy caterpillar of dry crops, cotton boll worms and the blackheaded caterpillar of coconut. An intensive study of some important insect pests of fruit trees and vegetables was started during the year and progress is recorded.

Measures were taken to control pests in the College Farm and breeding stations surrounding it. To this end, trials with different patent and locally made insecticides were made. With a view to get definite data on the periodical incidence of different insect pests which have a natural attraction for light, light traps were kept regularly at nights during the greater part of the year. Information has been gathered on the periods of emergence of such pests as paddy stem-borer, cock-chafers, groundnut surul, ragi white borer, hairy caterpillar moths, etc. This section also deals with quarantine and fumigation work. About 130 lots of various seeds were examined for fumigation and for issue of pest-free certificates intended for Ceylon, Malay, Great Britain, Germany, Africa, Australia, etc.

Reference was made last year to an apiary started during the year. This has now taken a definite shape. The strength of the apiary was from 20-30 hives of the common Indian bee. During the summer months tamarind flowers were the main source of honey, pasture being scanty between June and September, after which there was no dearth for food, flowers of crops like cholan, gingelly, safflower, Cambodia cotton supplying the necessary honey. Between December and March, 100 lb. of honey were extracted from about a dozen hives. Research work on the various aspects of bee-keeping was started. The apiary attracted the attention of many visitors from whom there was a big demand for colonies, hives and honey extractors. Arrangements were made to meet this demand. Two apprentices were under training.

The rearing of eri silk worms was started during the year. Eight broods were reared and the bionomics of the worm and the economics of the work as a cottage industry were studied. Several members of the district staff were trained by the Sericultural Expert at Samalkota and Madras in eri silk rearing and were posted to the agricultural stations with a view to teach ryots interested in this new and interesting side line. Unfortunately the difficulty of marketing the cocoons has been in the way of the spread of eri-silk culture.

E.—Horticulture.

26. The Botanic garden at Ootacamund and Coonoor continued to be popular among the visitors from the plains. In addition to maintaining the conservatories, nurseries and pleasure grounds in good order, several improvements were undertaken; the most important being the re-arranging and planting of the rockery immediately below the upper conservatory and the re-building of a portion of the revetment supporting the terrace on which the conservatory stands and converting it into a wall garden.

In all, 587 packets of seeds were sown and innumerable plants were raised by vegetative reproduction. Among the plants of economic value raised in the glass houses include a number of *Nephelium lappaceum* (Rambutan) some plants of a new variety of Avocado (*Persea gratissima*) and seedlings of *Ilex paraguayensis* (Yerba Mate or Paraguay tea). Among the new trees and shrubs that were planted in the different parts of the garden mention must be made of the four Rhododendrons presented by Lady Beatrix Stanley. With a view to create new hybrids and varieties a number of cross pollinations were effected between different species and varieties of ornamental plants. The results are encouraging. Abutilon Var "Golden fleece" X Abutilon Var "Pink" have produced orange coloured flowers in two different varieties.

In the Sim's Park Garden about half an acre of jungle below the lake bund was cleared and the site was planted up with ferns and other foliage plants and the lake margins with Azaleas, Cannas, Kniphofias.

Twenty-one new species of trees and shrubs were planted during the year in different places of the garden.

F.—Implements.

27. Of the three types of ploughs, Cooper Nos. 11, 25 and 26 which have been approved by the department, No. 11 underwent modification to the extent that it has been equipped with a cast iron frog and cast chilled landside in place of the existing steel parts with a view to ensure economy in the initial price of the plough. Initial cost plays an important role with the Indian cultivator, and efforts are made to keep it low without sacrificing efficiency. The Research Engineer is of the opinion that No. 11 selling as it does at the low price of Rs. 6 should, before long, replace No. 25 which is much less efficient though the difference in price between the two is only Rs. 2-8-0 in favour of the latter.

Two turnwrest ploughs were under trial in the black soils of Bellary district. The Research Engineer was engaged in testing the efficiency of several types of water lifts sent to him for trial, and in experimenting with simplified designs of the Persian wheel type which has achieved some success.

A new "hurricane" winnowing machine obtained from England at a cost of Rs. 190 was put to test, and it is opined that for Indian conditions, a stronger and a more durable pattern would be necessary.

A ball bearing mhote wheel manufactured by Messrs. P. S. G. & Sons Charity Industrial Institute, Coimbatore, has been approved after trial and is priced at Rs. 10-12-0 as against the roll easy mhote wheel of Messrs. Kirloskar & Co., hitherto sold at Rs. 14 per wheel.

G.—Livestock.

28. In view of the abolition of the Livestock Research Station, Chintaladevi, and the Buffalo Station at Guntur, work in this section was confined mainly to Hosur. The supervision of the dairy herd at the College was transferred to the Principal. Small herds of cattle for purposes of milk to the farm staff and production of calves for sale to the public were maintained at several agricultural stations.

As in previous years work progressed in the improvement of the four important breeds, namely, the Kangayam, Ongole, Scindhi and Cross-breds. The total number of livestock at the end of the year including breeding bulls at Madras was 614 as against 904 last year. This large reduction is consequent on the orders of Government issued for the curtailment of the activities of this section.

Cross-bred Herd.—A number of cows of this breed was sold and some transferred to Coimbatore for the College Dairy. An experiment on breeding half-bred to half-bred which has been going on

since 1919 has been closed during the year. The results may be summarized as follows :—

- (1) The calves of the second and third generations did not grow as well as those of the first generation. This may be due to the fact that the latter suckled their dams while the former were hand-fed.
- (2) There was a tendency for the age of the cows at first calving to increase in the second to fourth generation when compared with the first generation cows.
- (3) Compared with the foundation herd of Scindhi cows the cross-breds gave a higher yield of milk per day ranging from 3-5 lb., but the increase was more noticeable in the first generation than in the second and third. Fifty per cent of the first generation cows gave over 6,000 lb. of milk in a lactation as against the yield of 3,431 lb. of the original Scindhi herd. The second and third generation cows have respectively yielded 4,068 and 4,151 lb. during the same period.
- (4) The height and weight measurements decreased slightly in each generation and appeared to be reverting to the Scindhi mothers.

These cows are now served by Scindhi bulls in order to breed back to the country herd.

Ongole Herd.—There is very little demand for this breed at Hosur and the animals themselves do not thrive well in this tract. It has been decided to discontinue maintaining this breed here. There were only eight cows on the average each of which yielded 10 lb. of milk per day.

Scindhi Herd.—This breed thrives in this locality and the breeding bulls are primarily intended for the improvement of the poor cattle of the West Coast. There were 24 cows during the year which yielded on the average 12.6 lb. per cow a day. The farm bred heifers show a slight tendency to improve in their performances at the bucket as compared with their dams.

Kangayam Herd.—The demand for bulls of this breed continues to increase and it is found not possible adequately to meet it. Being a notable draught breed, its milk yield continues poor, though a very slight improvement is noticed when compared with the foundation herd.

Breeding Bulls.—The seven breeding bulls maintained at Madras performed 573 services during the year. There were 71 bulls under the premium scheme at the beginning of the year and 72 at the end of it. There is a very large demand for premium bulls, and an increase of grant for this scheme is clearly needed.

Sheep.—There were 134 sheep in the flock. The improvement of this flock which was originally transferred from Bellary has not

so far achieved much success. The object is to evolve a pure white or a white black faced breed which would yield a good fleece of wool and fatten quickly. The pure white lambs are constitutionally weak, while the black faced are better, but their wool production is less. The white sheep are about 6 lb. less in weight than the others.

Poultry.—Six different breeds were maintained at Hosur. While white leghorns are the heaviest producers of eggs, with an average of 184 per pullet per annum, the Black Minorcas lay the largest egg. The size of eggs of the country hens is just over half the size of those of the imported breeds, and it is clear that the aim should be to improve the former by careful grading, which is likely to be accomplished in about five or six years.

H.—Mycology.

29. This section deals with those diseases of crops which are caused by fungi—

(i) *Paddy.*—Studies of the disease known as the “foot rot” on paddy and treatment for the same were continued. Good results have been obtained by treating paddy dry with Granosan and Ceresan and wet with Uspulum, formalin, copper sulphate, mercuric chloride and hot water.

(ii) *Sugarcane—Mosaic.*—The experiment to study the relative resistance of different varieties to sugarcane mosaic was continued. Twenty varieties of canes were grown inter-stripped with rows of diseased Co. 213 material. Of these eight varieties proved highly resistant while four proved highly susceptible.

The experiment to determine the loss due to the attack of mosaic was repeated and the results obtained are in conformity with those obtained last year. The reduction in sucrose is not so marked but the reduction in weight of canes is considerably higher.

(iii) Studies on wilt on plantain, redgram, betel vine leaf spot and fruit rot diseases are in progress.

I.—Trial Plots.

30. There were during the year about 130 trial plots conducted on paddy, ragi, sorghum, sugarcane, cotton and groundnut. In paddy in the I circle, trials were conducted in 11 centres in the East and West Godavari districts. A strain from *Krishnakutulu* gave from 80 to 100 per cent increase over the standard. In the Kistna district, a *Kusuma* strain gave 16 per cent increase over the local. In Guntur district, strains from *Kusuma* and *Vankisannam*, gave equally encouraging results. In the IV circle, Co. 5 and Co. 7 were under trial, the latter being found preferable to the former. G.E.B. 24 as a drilled crop yielded 18 per cent more than the broadcast local paddy in Palmaner and Wallajah taluks. Similar trials were successfully made in paddy in the V circle.

In the I circle, *punasa ragi* strain No. 525 gave an increased yield of over 21 per cent over the bulk. In the IV circle, it has been proved that T. 8 and E.C. 593 are decidedly better than the local varieties but are late in maturity by about two to three weeks. E.C. 47 tried at Palni, gave a disappointing yield. It was badly affected by *Piricularia*.

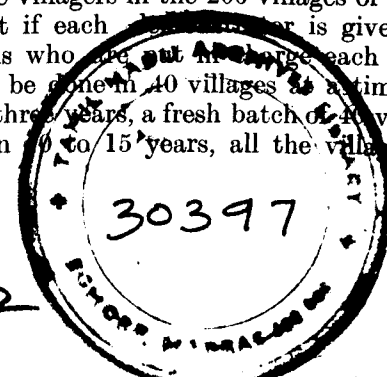
In cotton, No. 171, a strain from the Cocanadas was tried for the first time in the district in the II circle. When sown in September, there was not much difference in yield, while it gave 20 per cent increase over the local variety when sown in October. Comparative trials in C. 7, A. 10 and S. 46 were continued in three centres in the VI circle with varying success.

In sugarcane, in South Arcot district, Co. 213, Co. 281 and B. 247 were tried. B. 247 gave the best result with an acre yield of 44 tons as against 40 and 32 tons respectively of Co. 213 and Co. 281. The trials made in sugarcane varieties in Chittoor did not give any conclusive results and will be continued next season.

Two varieties of potatoes—Great Scot and Royal Kidney—from the Nanjanad Potato station were tried with success at Kodaikanal.

V.—DEMONSTRATION.

31. The concentration of demonstration work in a few selected centres which was begun in 1930–31 due to a change in the policy of the departmental methods of demonstration was continued during the year under report. A demonstrator cannot entirely neglect the area of his jurisdiction outside the central villages. The present arrangement is that he works in the central villages regularly and visits other villages only when called for. In the year under report, there has been extension of work, e.g., in regard to the production and supply of paddy and cotton seed and in regard to sugarcane cultivation and there have been more calls on the time of the demonstrator for work outside the central villages than before. It seems to me that the time has come when the intensive work of the demonstrator should be extended to more than three or four central villages. Experience has shown that while a demonstrator is needed to make intelligent propaganda in a village there is also need for a demonstration maistri in continuous touch with the village who can get the things done which the ryots agree to do. Again, the undoubtedly valuable research work that is being done in the department is not at present fully effective for want of a connecting link between the demonstrator and the villagers in the 200 villages or so of his jurisdiction. It is felt that if each village is given, say, eight demonstration maistris who are out in each of five villages, intensive work may be done in 40 villages at a time, and, after this is done for two or three years, a fresh batch of villages may be taken up. Thus in 10 to 15 years, all the villages in a taluk may be covered.



A.—*Demonstration Plots.*

32. As in the previous two years, the demonstration plots were mainly confined to the centres of work and totalled 2,733. The demonstrations related chiefly to specific items of improvement on crops like paddy, sugarcane, ragi, fruit, cotton, etc. The main items included demonstrations in ploughing, intercultivation, manures and improved strains.

B.—*Exhibitions and Shows.*

33. The help of the department was invoked as in the past on occasions such as Co-operative and District Conferences, Health and Baby Week celebrations. These opportunities were as far as possible utilized for arranging exhibitions. The various village fairs, festivals and jamabandi camps also provided opportunities for conducting smaller shows for the benefit of the rural population. There were in all 168 such exhibitions and shows as against 150 in the previous year. As is usual on such occasions popular lectures on agricultural subjects were delivered by the demonstration staff mainly with the aid of lantern slides. About 500 lectures were delivered during the year.

The three motor units continued their itinerary throughout the Presidency except in the Nilgiris, spending about four months in each circle. One of the units toured in Coorg for a week. Officers of the Veterinary, Fisheries, Industries and Public Health Departments continued to co-operate with this department by accompanying the vans and bringing to the notice of the ryots the propaganda activities represented by the departments concerned.

C.—*Items of Propaganda.*

(1) Crops.

34. (a) *Methods of cultivation.*—In regard to the reduction of seed rates in sowing, the chief crops concerned were paddy and sugarcane. In the case of paddy, the improvement is being demonstrated for several years and in a number of districts and a considerable reduction has been effected. The seed rate adopted however varied from district to district. Owing to the bad season, a setback was received in the attempt to reduce the seed rate in the Vizagapatam district where the practice is to sow 1,500 lb. of seed per acre of seed bed. However, 1,368 acres of seed beds were sown at a reduced seed rate in that district. In the third circle, the seed rate was reduced by about one-third on an area of 26,750 acres. The reduction of seed rate in the VI circle was as much as 50 per cent, i.e., from 30 m.m. to 15 m.m. The practice of planting seedlings in twos and threes is spreading, especially in Godavari and Vizagapatam districts where the area thus treated was 28,096 and 11,960 acres respectively. The employment of iron ploughs instead of the time-honoured wooden ones is becoming popular in several districts. In regard to sugarcane, improved methods of cultivation include line planting, trenching and wide spacing. The

practice of planting sugarcane in lines and also of wide spacing is increasing in the I circle while wide spacing and the use of deep furrows are becoming popular in the III circle, the area affected in the Bellary and Anantapur districts being 345 acres as against 45 acres in the previous year.

By raising sugarcane seed from "short crop," i.e., using the immature cane as the planting material when the crop is six months old, it was found in the previous year that in Vizagapatam the germination improved by 10 per cent and the yield by 15 per cent. During the year under report, an area of 34 acres was "short cropped" as against two in the previous year in Vizagapatam, while in the II circle short planting for supply of seed material was introduced in select centres.

Drill sowing of dry crops has made some headway in the south. The area under drill cultivation in the VI circle alone was 17,000 acres.

Dibbling Cambodia cotton seed in lines was continued by the ryots of the VIII circle.

In the I circle, the method of sowing groundnut in every furrow instead of in alternate furrows has resulted in an increased yield of 20 per cent, the area sown being 106 acres.

(b) *Methods of Manuring.*—Green manure supplemented by bone-meal or superphosphate for paddy and oil cake in conjunction with ammonium sulphate for sugarcane were recommended as before. But owing to the economic depression, the demand for phosphatic manures and oil cake was less than in the previous year. The manuring of fruit-trees also received attention. Demonstrations in manuring potatoes with artificial manures in addition to farm-yard manure in the VIII circle gave 40 to 50 per cent increased yields over local manuring, yielding an extra profit of Rs. 18-30 per acre.

(c) *Seed Distribution.*—Distribution of improved strains evolved by crop specialists has all along been one of the main lines of activity of the department. The greatest progress made so far has been in the most important crops, paddy, cotton and sugarcane. To a limited extent efforts are made in the case of millets also.

Cotton.—The greatest activity evinced in the production and distribution of Cambodia cotton strain was in the VIII circle, Co. 2 continuing to be the most popular strain under distribution. Through the efforts of the department, 390, 403 lb. of seed were distributed by the department. Besides this, 108, 923 lb. of co-operatively ginned seed was distributed by the ryots themselves. The seed farm area maintained by the Tiruppur Co-operative Trading Society increased from 725 acres to 2,000 acres due to the financial aid rendered by the Indian Central Cotton Committee and the Local Government. As the sale price of lint continued to be low this year also, the premium obtained for this cotton was only

Rs. 10 per candy over market prices. In the VI circle, 49,488 lb. of the same strain were distributed. In the I circle, Co. 2 was tried in several plots of wet land in the delta as a second crop after paddy. It has also been tried on garden and dry land in the Vizagapatam district. The results are awaited. The total quantity of seed distributed in the Presidency both by the department and ryots amounted to nearly 565,566 lb.

The production of karunganni seed is in the main confined to the VI circle, though 123,987 lb. of C. 7 were produced in the seed farms of the VIII circle. Both the circles were responsible for the sale of 234,957 lb. of seed.

In the Bellary district H-1 strain of the "Westerns" cotton continued to be distributed, the area under it being $1\frac{1}{2}$ lakhs of acres. The quantity distributed amounted to 169,071 lb. seed including the quantity issued to seed farm ryots for sowing in the 1932-33 season. One hundred and forty bales of ryots' lint of 400 lb. each were sold with the help of the department at a premium of Rs. 12-15 per bale over local cotton.

A scheme for the extension of the area under this cotton to three lakhs of acres in five years was sanctioned by the Indian Central Cotton Committee at the close of the year.

N. 14, a strain of the "Northerns" in the Kurnool district, continued to be distributed. 111,153 lb. of seed was distributed to the ryots.

Coconut.—Improvements suggested for this crop are wide spacing, new varieties, intercultivation and manuring of gardens. The low price for coconut and the general economic depression militated against the extension of coconut cultivation on the West Coast; a large number of demonstration plots continued to be run, some belonging to the South Kanara District Board. 4,720 seedlings and 600 seed nuts were supplied to the ryots both in the East and West Coasts.

A demonstrator with two coolies was deputed for six months to the Laccadive Islands for demonstrating improved methods of cultivation.

Korai Cultivation for mat-making.—No work during the year is reported.

Paddy.—The progress reported in last year's report in the spread of the strains evolved and bulk selections made by the department continued to be maintained, the total amount sold going up to 280 tons as compared with 200 tons of last year and 160 of the year before. Besides the production of seed directly by the department, large areas of seed farm on ryots' land under departmental supervision were started and sufficient seed for about three lakhs of acres has been produced. Arrangements have been made for the supply of this seed to ryots. G.E.B. 24 continues to be popular throughout

the Presidency. It has made considerable headway in the Ceded districts and Malabar owing to its remarkable cosmopolitan qualities. In spite of the low prices prevailing and reduced demand for paddy, an extra profit of Rs. 10 is easily obtained for this variety owing to its superior quality and increased yield. The V circle still continues to top other circles in the matter of distribution of paddy seed. The distribution of seed through seed farms, co-operative societies and selected seedsmen during the year was 4,373,607 lb. About 3,200,136 lb. of seed has been reserved for sowing next season in the circle.

On the West Coast, Co. 3, one of the Coimbatore strains issued, is reported to be popular in South Kanara. About 48,730 acres are under departmental seed in the circle.

Potato.—One thousand six hundred and sixty-eight maunds of potato seed were distributed during the year, of which 980 maunds were issued under seed farm conditions. Whole tubers yielded 7,500 lb. per acre as against 3,800 lb. yielded by small cut setts and further demonstrations will be carried out.

Ragi.—T-8 a strain of Ragi evolved in the Hagari Agricultural Research Station, has met with varied success. In Anantapur its longer duration and the necessity for additional irrigation for two weeks without being compensated by increased yield are large handicaps to its spread. In the Kurnool division, it has given about 10 per cent increase which is valued at Rs. 3 per acre. In Guntur district however, an increased yield of 160-200 lb. per acre was obtained.

The Mysore strain H-22 has firmly established itself as a dry crop in North Salem where the area under this variety was 4,000 acres. The results of E.C. 47 in Coimbatore, one of the selections of the Millet Specialist, were again conflicting. E.C. 593, another strain evolved by the Millet Specialist, fared better and showed an increased yield over the local in the district except in Pollachi.

Sorghum.—The performance of A.S. 1,543, 1,575, 60 and 809 in the VIII circle was not good inasmuch as the results were conflicting.

T-1 (Hagari) was introduced for the first time in the Guntur circle. In the III circle, it gave an increased yield of 20 per cent under dry conditions and 50 per cent under irrigated conditions, over the local. 10,928 lb. of T-1 and T-6 (Nandyal) were distributed in the Ceded districts during the year as against 6,400 lb. last year.

Sugarcane.—J. 247 continued to be popular in Vizagapatam. Co. 213, introduced last year and which requires little or no irrigation in that district and restricted irrigation elsewhere, is another variety which is coming into prominence. An acre yield of 15-20 candies of jaggery was obtained and its quality was good. Fiji B is holding the field in South Arcot as the sugar factory at Nellikuppam prefers only this variety to any other on account of its high sucrose content, and paid Rs. 15 per ton delivered at the factory.

Other Coimbatore varieties tried in Vizagapatam and Coimbatore were Co. 243, Co. 281 and Co. 313 and sorghum hybrids: Co. 366 and 367.

The desirability of substituting sugarcane for paddy has of late been impressed on the ryots of the Presidency. The high tariff on imported sugar has stimulated the manufacture of sugar with open pans and centrifugals. The construction of Sindewahe furnaces for making jaggery in the different parts of the Presidency continued to be demonstrated. In Hospet, a multiple furnace was worked with success; the jaggery prepared commanded a premium of Rs. 6 per candy of 500 lb. in the local market owing to its better quality.

(2) Fodder.

35. The rapid spread of *pillipesara* in the I and II circles is a noticeable feature of the year. Owing to the great demand for this seed, merchants have taken up the supply in the II circle. An area of 18,197 acres was put down to various fodders in the I circle, an increase of 6,000 acres over last year. The cultivation of fodder crops like *Kolukkattai* grass, elephant grass, Guinea grass, sunnhemp and *pillipesara* was advocated as in the previous year and several consignments of seed and slips were supplied. Silage manufacture was demonstrated in the VII and VIII circles and 15 pits were constructed.

(3) Fruit.

36. Propaganda was continued to be done on the chief fruits, plantain, sapotas, citrus and mangoes and assistance was also afforded in regard to other fruits. Notwithstanding the fall in prices of plantain, an area of 2,410 acres as against 1,200 acres last year was put under this crop in the Godavari delta. Attempts have been made to keep the plantain growers in the V and VI circles in touch with purchasers in North Indian cities like Delhi, Agra, Patna, etc., but so far the high railway freight has been in the way of an extension of trade. The railway authorities too have been approached with a view to reduction of freight and quickening of transport. 1,133 citrus seedlings raised at the Agricultural Research station, Anakapalle were sold and 10,805 fruit trees of mangoes, sapotas, cashewnuts planted in the I circle. Special attention was paid in other circles also to the propagation of fruit trees and plants of several varieties were planted. 34,412 fruit seedlings and suckers—mostly suckers of pine apples—were supplied in the VII circle.

The extension of the area of cashewnut was foreshadowed in last year's report. Its cultivation was extended to the II circle where 200 lb. of seed was distributed in new areas; considerable progress was made also in the VI circle where as many as 20,000 trees were planted. Unfortunately the market for cashewnut has considerably gone down. Grape vine cultivation was introduced in eight villages of the Godavari district.

A demonstrator conducted a survey of the fruit areas in the IV and III circles.

(4) Implements.

37. The number of demonstrations conducted with different kinds of ploughs and H.M. Guntaka rose from 5,000 last year to 6,800, the VI circle claiming as many as 1,700 to its credit. Demonstrations with Roll Easy Mhote wheels, Archemidian screws for lifting water were also conducted. Although the number of ploughs and other important implements purchased by the ryots cannot be correctly stated, as far as the departmental figures are available, the number sold in each is given below:—

Bund formers	..	29	Chaff cutters	..	16
H.M. Guntakas	..	83	Mhote wheels	..	60
Iron ploughs	..	1,394	Buckscrapers	..	5
Sugarcane Mills	..	88	Archemidian screws	..	10

(5) Livestock.

38. The three bulls maintained in the Agency were not in demand and they were therefore withdrawn during the year. There were 71 bulls under the premia scheme at the beginning of the year. Twenty-eight new bulls were approved, of which 13 were farm bred. Twenty-seven bulls were removed 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 72. In addition there were 127 bulls at stud including those at research stations, jails and Veterinary hospitals. The improvement of breeds of poultry continued to receive the attention of the department. Several hundreds of eggs for setting as well as chicks of good breeds were supplied to the ryots.

(6) Loans.

39. The following statement shows the number and amount of loans sanctioned during 1932-33, for the purchase of implements:—

			NO.	RS.	A.	P.
Ploughs	..	..	31	120	12	0
Persian wheels	..	..	2	900	0	0
Sugarcane power crushers	..	..	2	700	0	0
Roll easy mhote wheel	..	..	1	41	12	0
Total	..	..	36	1,762	8	0

(7) Manures.

40. *Farm-yard Manure*.—During the year the number of manure pits maintained in the I circle rose from 3,800 in the last year to 5,278 which is by no means a small achievement. Demonstrations in this line of improving the methods of manure preservation were continued with vigour. The total number of manure pits maintained at the suggestion of the department amounted to 9,962, besides which there were 2,378 dry earth sheds, 96 byres and 47 loose boxes.

Compost.—Along with the propaganda for the proper methods in the preservation of farm-yard manure, the utility of preserving all organic matter in the shape of waste litter, fallen leaves, stubbles, grass and weeds was impressed on the ryots. At the instance of the department, 617 compost pits were made during the year as against 550 in the last year.

Green Manures.—These comprise mostly dhaincha, sunnhemp, wild indigo, indigo and pillipesara. The demand for pillipesara in the Godavari delta was great and a quantity of 1,700 tons was produced for distribution there. The V circle has made a fair progress in the production and distribution of green manure seed, specially wild indigo. About 20 tons of seed were sold by the department and 100 tons were purchased by the ryots either direct or through co-operative societies in that circle. The total quantity of all the green manure seed distributed to ryots amounted to 380 tons as against 174 tons last year.

Artificials.—There was a decline in the use of oil cakes and the demand for fertilizers was practically nil, except in the II circle, owing to the economic depression. Two thousand two hundred and sixty pounds of bone meal were sold in the II circle by the department and very good business was done in that circle by the firms dealing in fertilizers.

(8) Pests and Diseases.

41. The special demonstrators in Mycology and Entomology attached to most of the circles carried on demonstrations dealing with various insect pests and diseases. A new device against rust on sorghum was demonstrated with success in the II circle by using sulphur dust in place of copper sulphate. Dust for 100 acres was distributed free. After the introduction of the cochineal insect, prickly-pear is fast disappearing in the Presidency. In the V circle, 4,000 coconut trees were saved from damage by Nephthys Serinopa by the introduction of parasites. During the year, another serious pest on coconut, the slug caterpillar, broke out near Chowghat in Malabar and timely control measures were taken. Mildew on grapes in the V circle was kept in check by the timely spraying of bordeaux mixture.

D.—Work through other Agencies.

(1) Co-operation.

42. As desired by Government in their orders on last year's Administration Report, the improvements effected in each circle through co-operative societies are recorded below.

Through the Loan and Sale Society at Anakapalle in the I circle it was possible to sell Rs. 33,455 worth of jaggery. Twenty-one hundredweights of paddy seed were distributed through the co-operative society in Chodavaram sub-circle. The Atchanta

co-operative society in West Godavari district purchased 106 bags of sunnhemp seed and distributed it to 40 members at the instance of the Agricultural Department.

In the second circle in the spread of the practice of green manuring, the assistance of co-operative societies was enlisted. Eight hundred pounds of wild indigo and 328 lb. of dhaincha seed were supplied through them. At the instance of the department, about 30 acres of paddy crop were manured with bone meal and ammonium sulphate by the Adi-Andhra Co-operative Society, Tenali.

About 44 bales of cotton were sold by the Bantanahal Agricultural Improvement Co-operative Society in third circle at a premium of Rs. 12-8-0 per bale, and a small quantity was also sold through the Tadpatri Loan and Sale Society at a premium of Rs. 8 per bale. This society also purchased 11,165 lb. of H. 1 cotton seed for distribution among its members. The Polur Agricultural Improvement Society in Kurnool district sold 71,861 lb. of N. 14 seed.

In the fourth circle with the help of the Co-operative Department and the central banks at Cuddalore and Tiruvannamalai, a scheme for the marketing of groundnut of the ryots in both South and North Arcot districts was brought into operation during the year. According to this scheme, ryots were induced to bring their produce to marketing centres like Tiruvannamalai, Tirukkoyilur, Vriddhachalam and Cuddalore where warehouses were also established. Ryots were given increased facilities in the matter of producing groundnut and in disposing of the produce. For cultivating the crop, advances were given in the beginning of the season in the shape of short term loans by the central banks through the various primary banks. The produce when ready was to be brought for sale to the marketing centres, where additional facilities were given to them to secure further advances on their agreeing to pledge the produce to the Loan and Sale Society and to store it in the warehouses engaged by it, so that it may undertake to sell the produce at a time when the market was favourable.

Out of the nine co-operative agricultural societies working in the fifth circle, all but three are functioning well. On the whole, 45,152 lb. of paddy seed and 7,857 lb. of green manure seed were distributed by the societies, and about 1,220 tons of artificial manures and two Cooper No. 25 ploughs were purchased by members through the societies.

A special demonstrator continued to be placed at the disposal of the Koilpatti Loan and Sale Society in the sixth circle and he was helpful in grading and marketing cotton and stocking pure seed. The Co-operative society at Melacheval and the Agricultural Improvements Society at Velur each purchased a breeding bull; the Dindigul Cotton Sale Society and the Velur Agricultural Society sold 23,856 lb. of cotton seed for seed purposes during the season.

In the seventh circle a meeting of the pepper growers round about Taliparamba was convened and an application for starting a loan and sale society for their benefit was sent to the Deputy Registrar of Co-operative Societies, Calicut. Demonstrators attended the meetings of the co-operative unions in their respective centres and educated the members on the activities of the Agricultural Department.

In the eighth circle, a new scheme for Co. 2 seed production, financed by the Indian Central Cotton Committee, Bombay, was started during the year by the Tiruppur Co-operative Trading Society. In this scheme, the 1,000 acres of seed farms run by the Agricultural Department is called the "inner area" and will supply seed to the "outer area" controlled by the Tiruppur Co-operative Trading Society with the help of the Business Manager. Last year the society handled 760 bags of Co. 2 seed and during the year under report, 2,000 acres of seed farms were under their control.

(2) Agricultural Associations.

An attempt was made to revive the defunct Ganjam Agricultural Association and a scheme of work was drawn up. A new Association styled "The Chamber of Agriculture" for South Arcot was formed at Cuddalore during the year. The plantain grower's section of the Trichinopoly District Agricultural Association deputed its representative to tour in Northern India to study the market for plantains there. Fifteen village agricultural associations were started in the Trichinopoly district.

VI.—LEGISLATION.

43. *Cotton Ginning and Pressing Factories Act*.—This Act continued in force during the year. The number of ginning factories in the year rose from 529 to 556 of which nearly 100 did not work during the season. There was no increase in the number of pressing factories which were 67 during the year of which six factories did not do any pressing work. The number of cases of owners of ginning factories prosecuted and fined for infringement of provisions of the Act rose from seven in the previous year to 15 in the year under report.

44. *Cotton Transport Act*.—This Act also continued in force during the year. The absence of restriction on the movement of cotton by road and river continues, with the result that the object of the Act is partially defeated as Mysore and Malabar cotton is taken to Tiruppur and that from the Nizam's dominions gets into the districts of Bellary and Kurnool. To prevent to a large extent the irregular transport of Cocanadas into the Kurnool district, the northernmost railway station in the Northern and Western tract, viz., Cumbum which was near to Tarlapaud in the Cocanada tract was changed to Chilama. This is 44 miles from Cumbum in the interior of the Kurnool district and the range of hills and rivers

between these places will now render the transport by road difficult and unprofitable. Steps have been taken to try Ceylon cotton in Malabar to replace the local inferior cotton. The general question of controlling irregular transport of cotton by road and river was considered in all its aspects. It is found to be not feasible without considerable expense to check entry of cotton by road. Bombay has found it possible to open check stations only on main roads but that is not enough.

Single licences by rail.—Twelve were issued against 13 in the previous year, of which 10 were for import into the "Southern" area and two into the "Northern" area.

Annual licences.—Twelve licences with 268 certified copies were issued for use by mills in the "Southern" area as against 11 licences and 328 certified copies in the previous year. Only 217 copies were used as against 262 of the previous year. In addition, six licences and 98 certified copies have been issued from 1st February 1933 to 31st March 1933 to the mills in the Southern tract.

Import by sea.—Fifty-six licences were issued for the import of 31,891 bales of cotton into Tuticorin as against 87 licences for 49,675 bales in the previous year.

The Cotton Control Act passed at the close of last year prohibiting the cultivation and mixing of pulichai (*G. neglectum*) cotton and its sale was not strictly enforced during the year as seed for sowing had been obtained by ryots before the provisions of the Act and rules were widely published and circulated. The publication and circulation of a note about the provisions of the Act and warning the ryots that the Act will be rigorously enforced next season will, it is hoped, have a salutary effect.

45. *Cotton Market*.—A Bill to provide for the establishment and the better regulation of markets for commercial crops in the Madras Presidency was passed by the Legislative Council at the close of the year. The question of selecting Tiruppur as the first notified area for cotton under the Act is under consideration.

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

Cotton.—The Act was 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 though with some delay in some cases. In Trichinopoly, with the exception of a few cases, the crop was removed before the stipulated time. There was delay in Madura district owing to favourable rains in July-August. One hundred and seventy-six

prosecutions were launched in Periyakulam, Tirumangalam and Palni taluks. Considerable improvement was noticed in Coimbatore district in the eradication as on the 1st September the standing area amounted to only 256.56 acres as against 928.9 acres last year. In Salem the eradication was completed before the 31st August. There were only three defaulters in Rasipur taluk.

Ryots of Thoraiyur and Angalakurichi wanted their villages to be excluded from the operation of Pest Act and the question is being examined.

Groundnut.—The Act was enforced against the Red Hairy Caterpillar pest (*Amsacta Albistriga*) on groundnut in Vriddhachalam, Kallakurichi and Tirukkoyilur taluks of South Arcot district, in Tiruvannamalai and Polur taluks of North Arcot district, all the Government, inam and zamin villages of Andimadam, Jayakundam and Manapathur firkas of the Udayarpalaiyam taluk in Trichinopoly district, and Salem and Rasipur taluks of the Salem district. In the South and North Arcot districts, the pest appeared in varying degrees of severity and when action was taken by the ryots in time, they were able to save the crop. In Udayarpalaiyam taluk of Trichinopoly district the ryots have generally understood the benefits of the Act and have co-operated in carrying out the remedial measures. In Salem and Rasipur taluks, the pest appeared this year in a mild form and the Act had only to be enforced in a few villages. The ryots are becoming more and more alive to the necessity for taking prompt action immediately the pest is noticed.

Palmryra.—The Act was enforced in respect of Budrot of palmyra in the Palghat taluk, Malabar district, from the beginning of March 1933. The disease has spread throughout the Palghat taluk. A Sub-Assistant was specially stationed in the taluk to carry on propaganda work in connexion with the control of the disease. By persuasion, about 2,500 diseased trees were cut during the year. The disease appeared on coconut in about 30 gardens in the interior of Kottayam taluk. By prompt action 151 diseased trees were cut and 56 trees were operated and the disease was brought under control.

The Act is also in force in East and West Godavari, Kistna and Guntur districts. The demonstrators in these tracts are giving advice to the ryots regarding the remedial measures to be taken. They are also advised of the evils which would follow if they failed to take remedial measures. The percentage of affected trees in Razole taluk is reported to be high and it is suggested by the Assistant Director of Agriculture, Rajahmundry, that it would be better if the Pest Act is enforced in Razole and Amalapuram taluks. The Collector of East Godavari has been addressed in the matter.

Water Hyacinth.—The Act is in operation in districts of Ganjam, Kistna, Guntur, South Arcot, Tanjore, Madura and Malabar for the eradication of water hyacinth from water sources.

VII.—PUBLICATIONS.

47. The undermentioned leaflets and bulletins were published during the year 1932-33 :—

Subject.	Languages in which published.	Price.
<i>Leaflet Series.</i>		
2. Conditions to be fulfilled for the grant of premia for breeding bulls.	Tamil, Kanarese and Malayalam published in 1931-32).	Free.
17. Improvement of sugarcane seed.	English	Do.
31. The mosaic disease of sugarcane	Tamil	Do.
34. Sprayers and spraying	Tamil and Kanarese.	Do.
36. Bud rot of palmyra	English, Kanarese and Tamil.	Do.
37. Mildew on grapes and how to prevent it	Tamil, Telugu and Kanarese.	Do.
38. Water hyacinth	Telugu, Malayalam, Kanarese and Oriya.	Do.
39. The Deccan grasshopper	English	Do.
40. Swarming caterpillar of paddy	Tamil, Telugu, Kanarese and Malayalam.	Do.
41. The rice bug	Tamil, Telugu and Kanarese.	Do.
42. The rice hispa	Telugu, Kanarese, Malayalam and Tamil.	Do.
43. Smut disease of cholam and tenai	Tamil, Telugu and Kanarese.	Do.
44. Control of rice grasshopper in Malabar	Malayalam	Do.
45. Early sowing of Cambodia cotton	English and Tamil	Do.
47. Note on cashewnut	English, Tamil, Kanarese, Telugu and Malayalam.	Do.
48. Paddy grasshopper and its control	English, Malayalam, Kanarese and Oriya.	Do.
49. Institution of prizes for calves born to premium bulls.	English, Tamil, Telugu, Kanarese and Malayalam.	Do.
<i>Notes.</i>		
8. What the ryot should do in Malabar and South Kanara to produce pure paddy.	English, Malayalam and Kanarese.	Free.
9. How to save temples and costly buildings from destruction.	English	Do.
<i>Bulletins.</i>		
28. Insects affecting the cotton plants in South India.	English	RS. A. P. 0 2 0
30. The cultivation of Coimbatore seedling sugarcane in South India.	English and Telugu	0 4 0

The Villagers' Calendar for 1932-33 was published as usual in English and the vernaculars and 59,860 copies were printed as shown below :—

English	6,200
Tamil	22,000
Telugu	23,600
Malayalam	5,500
Kanarese	2,560
Total ..	59,860

Books.—A handbook of some South Indian weeds by Rao Bahadur C. Tadulinga Mudaliyar was published during the year.

The third revised edition of the Manual of Elementary Botany for India by Dewan Bahadur K. Rangachariyar was undertaken during the year.

VIII.—STATISTICS.

48. The Committee appointed by the Government for the co-ordination of prices and other statistics concluded its labours and reported to Government that all statistical work should be confined in a central office like the Board. Government accordingly ordered the transfer of all statistical work done in this office to the Board of Revenue. The Statistical Assistant together with three clerks was transferred to the office of the Board of Revenue on the 1st November 1932 from which date all statistical work relating to crop forecasts, season and crop report, taluk and village accounts and prices is dealt with in that office.

49. *Weekly Cotton Mill and Press Return.*—There were 25 spinning mills in the year and all of them continued to send their returns of cotton received in their mills every week. Similarly returns from the 67 presses were continued to be received under the Cotton Ginning and Pressing Factories Act.

50. *Miscellaneous.*—Under orders from Government, M.R.Ry. Rao Sahib N. S. Kulandaiswami Pillai Avargal, Deputy Director of Agriculture, V Circle, was deputed to tour for a week in Ceylon to study the conditions there for the maintenance and extension of the market for Tanjore rice. The enquiry disclosed that Burma was holding the field in Ceylon on account of its ability to import cheap rice at low rates and that if Tanjore should compete with Burma, the railway and steamer freight charges should be reduced. The South Indian Railway has since reduced the freight to a certain extent.

IX.—EXPENDITURE.

51. The receipts and expenditure for the year 1932-33 and the corresponding figures for the previous year 1931-32 are as below :—

	1931-32.	1932-33.
	RS.	RS.
Expenditure	17,73,165	16,90,668
Receipts	2,09,536	2,02,372
Net expenditure	15,63,629	14,88,296

NOTE.—The above figures do not include schemes financed by the Imperial Council of Agricultural Research and the Indian Central Cotton Committee.

The decrease in expenditure in 1932-33 as compared with that of 1931-32 is due to—

- the reduction of staff due to retrenchment,
- the emergency cut in salaries and allowances of officers during the year, and
- economy observed in contingent expenditure.

With regard to the decrease under receipts this is as in the previous year due to the general trade depression prevailing everywhere.

X.—PROGRAMME OF WORK FOR 1933-34.

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

(i) *Research.*

A.—Research Stations.

(1) *Botany.*—Survey and study of weeds, fodder grasses, bananas and plantain varieties of the Presidency. Investigation of spike disease of sandal, studies of *Colletotrichum* with special reference to saltations and of vermicularea species. Revision of nomenclature of sheets in collections.

(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 fertilisers; study of the proper ratios in which nitrogen, phosphate and potash are required by different soils and different crops; utilization of night soil by activated sludge process and poudrette. Investigation into the use of indigenous and artificial fertilisers.

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 plantains for use in Europe and America, 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) *Millets.*—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 ground-nut; 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 cashew-nuts 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 red gram and Bengal gram.

(f) *Fruits.*—Budding and grafting of imported varieties of apples on stalks of the indigenous varieties; budding of imported varieties of plums on peaches; propagation of Litchis and Sapotas by "Gooty" layering in addition to the usual method of budding and grafting; budding of the "Avacado" pear on to seedlings of the same species; research on fruit culture in the plains from funds granted by the Imperial Council of Agricultural Research.

Miscellaneous.—Experimental cultivation of soya bean, Gambier, Tung (*Aleurites Fordii*) and *Diospyros mollis*, besides *Lupinus termis* and Rambutan.

(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. 213.

(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.*—Trials of reversible disc ploughs, cultivator's bund forming implements, tests of water lifts, seed drill and seed sower for attachment to country drill, experimentation with ground nut decorticating machines, and with improved design of jaggery boiling pan and furnace.

Irrigation.—Study of the water requirements of irrigated crops with V notches.

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

Crossbreds.—Breeding back of the crossbreds with Scindhe bulls.

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

Ongole and Kangayam.—Building a herd of animals of good draught type and fair milking capacity by selection.

Alambady.—Formation of a nucleus herd of this breed.

Buffalo.—Grading up the half and three-fourth breeds by the use of pure Delhi bulls.

Sheep.—Building a stock of a white-breed, paying attention to improvement of yield in wool and mutton.

Poultry.—Establishment of flocks of imported herds for distribution. Feeding trials of food-stuffs.

(7) *Mycology*.—Investigation of foot-rot of paddy, blast of paddy, false smut of paddy, pollu of pepper, wilt in betel-vine, diseases of red gram and bengal-gram, 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.—Cultural, manurial and varietal study of paddy and sugarcane; trials of strains of ragi and paddy; investigation of methods of cultivation, manurial and water requirements of sugarcane; trials of varieties of sugarcane; trial of citrus varieties; trials of Cambodia cotton and Roseum-Indicum crosses; trials of varieties of castor, gingelly, soy bean and vegetables; investigation into the damage caused by sugarcane borer and methods of control and the study of the pests of citrus and cotton, laphygma on onions and prodemia on tobacco; trial of centrifugals and sugar mills. Extension of work on sugarcane research from funds granted by the Imperial Council of Agricultural Research.

Samalkota.—Trial of growing sugarcane with restricted water supply; study of ratooning capacity of important canes; varietal study of plantains; study of treatment of plant materials, flowering, bunch characters, ripening and keeping qualities, effect of various doses of manures in regard to plantains; experiments with garden land crops in rotation with paddy; cultivation of vegetables with special reference to intergeneric and interspecific hybridisation; studies in flowering and fruiting of pine apple, mango and sapota; investigations on the water requirements of paddy, sugarcane, and plantains; growing of various crops in the second season.

Guntur.—Selection of high yielding strains of cotton; study of characters of chilly plants; selection work in chillies; manurial and insecticidal experiments on chillies; hybridisation with brinjals and similar crops to impart hairiness to the chilly plant for minimizing thrip attack; manurial experiments on tobacco and comparative trials of different varieties; study of the causes of remedies for "damping" off disease on tobacco; selection work in maize.

Nandyal and Hagari.—Evolution of high yielding and drought resistant strains of cotton and sorghum; trial of Cambodia as a dry crop; trial of varieties of zizyphus, pomegranate, fig, vines, and Bagdad date; sub-soil ploughing; investigation into the practical method of erecting bunds in fields with drilled seed. Selection of single plants of onion, *setaria*, groundnut, bengal-gram and chilly; experiments on grading of sorghum seed; experiments with

drette; experiments on retention of soil moisture and deep ploughing. Extension of work on dry farming from funds granted the Imperial Council of Agricultural Research.

Palur.—Testing of varieties of sugarcane; investigations of methods of manure and of the effect of varying rotation on sugarcane and paddy; testing of strains of paddy; study of semi-dry lands; trials with varieties of soy bean and new varieties of vegetables like tomatoes; experiments on poudrette.

Aduthurai.—Testing and releasing of strains of paddy; study of artificial crosses; investigation on methods of manuring paddy; trial of different varieties of canes and their seasonal plantings; maintain cultivation and plantain fig making; trial of soy beans; growing and study of vegetable crops and fruit trees.

Kovilpatti.—Testing of strains of cotton; investigation into the harmful effects of fodder cholam preceding cotton; suitable rotation with cotton; trial of cumbu strains; manurial trials with cotton; root pruning experiments on cotton; ragi trials; trials of *surangi* cumbu, and *bilichigan* cholam; study of irrigated crops and collection of seed; selection in coriander and pulses; study of crosses between Indicum and Hirsutum.

Taliparamba.—Varietal and manurial trials of pepper; investigation on the effect of mosaic on the yield of cane; study of "pollu" disease on pepper. Varietal trials of Coimbatore canes; study of the behaviour of Co. 213 cane to restricted manuring and irrigation; test of African varieties of sorghum; trial of cotton varieties and testing their suitability to west coast; trial of the African variety of cashewnut; comparison of Trinidad ginger, and Bengal ginger with local ginger; trial of tung oil and other plants; trial of gambier seeds.

Nanjanad.—Varietal, manurial and cultural trial of potatoes; investigation on the keeping quality of seed potatoes. Extension of work on potato research from funds financed by the Imperial Council of Agricultural Research.

C.—Trial Plots.

First Circle.—J. 247 and Co. 213 varieties of sugarcane with restricted supply of water, types of ragi and paddy isolated at Anakapalle and Samalkot; trial of Co. 2 cultivation in wet land after paddy.

Second Circle.—Trial plots of paddy, sugarcane and Co. 2.

Third Circle.—Trial of sugarcane varieties, sorghum, long duration paddy varieties and cotton.

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

Fifth Circle.—Trial of improved varieties of paddy, Pusa variety of tobacco, Bellary onion and Periamanjil cholam. Trial of different canes and soy beans.

Government of Madras

DEVELOPMENT DEPARTMENT

G.O. No. 1179, 26th September 1933

Agriculture—Administration report—1932-33—Recorded.

(ii) *Demonstration.*

(1) *Crops.*—Strains of paddy, ragi, sorghum and cotton. 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, drilling implements and bund formers; improved sugarcane pans.

(3) *Manures.*—Proper methods of preserving cattle manure and manufacture of composts. Introduction of green manure crop for increasing organic matter in both garden and wet lands. Use of oil-cake for sugarcane.

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

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

(6) *Jaggery manufacture.*—Clean preparation; manufacture of sugar with the help of 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 in Government farms for educated men who have attained roughly the S.S.H.C. standard; helping in the introduction of courses in agriculture in middle and high schools; continuation of farm labourers' schools.

READ—the following paper :—

From the Director of Agriculture, dated 1st August 1933,
R.O.C. No. D-68-Pdl./32.

Order—No. 1179, Development, dated 26th September 1933.

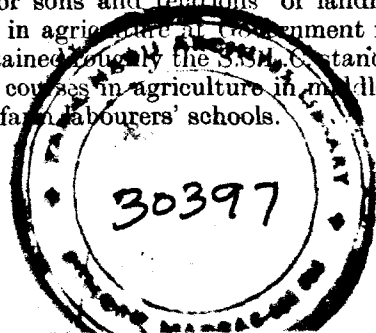
There was no change in the Direction. Mr. S. V. Ramamurti continued to be in charge of the department. The department suffered a rather severe retrenchment of staff. All the statistical work hitherto carried out in the Director's office was transferred to the Board of Revenue in November 1932.

2. The agricultural middle school at Taliparamba was closed during the year, and the school at Kalahasti has not yet been opened. Middle school education has not been a success, but it is gratifying to note that the middle school maintained by the Madura District Board at Usilampatti was so well attended. There has not been the same demand for admission to the college at Coimbatore. The number of applications fell, evidently as a result of the difficulties experienced by the graduates in securing employment in this department. But the Agricultural Department is not the only career open to agricultural graduates. The Government wish to emphasize that the aim of the college is primarily to train agriculturists who will go back to their own lands and improve their own agricultural practice on scientific lines.

3. The general effect of the monsoon on the operations of the several agricultural stations was adverse, though in a few places and in respect of a few crops the season was favourable.

Research received adequate attention. Special mention may be made of the study of indigenous fodder-grass, of the study and survey of bananas and plantains and of the study of soil nitrogen.

J. 2117 N32
N33



The study of the influence of manuring on the quality of the crop is obviously of great importance. The evolution of a superior, high yielding strain of ragi, which has been favourably reported on from different centres, is also noteworthy. Three strains of sorghum at Nandyal have given a high yield. Spacing experiments have succeeded in demonstrating the possibility of increased yields and a bolder grain. Nine new strains of paddy were released for distribution to ryots and several new strains were in various stages of trial. The results of a green manure crop in rotation with cotton are very striking. Increased attention is being given to fruit cultivation. A scheme of research financed by the Imperial Council of Agricultural Research will shortly be introduced, and land for the opening of a farm in the Cuddapah district is being acquired for the purpose.

The adoption of sugarcane as an alternative crop to paddy, under present price conditions, is of particular importance. The Imperial Council of Agricultural Research has come to the help of the department in financing a scheme of research to be carried out at Anakapalle and Chittoor. Experiments were made to find varieties of cane, other than the sorghum hybrids, which have more than one ripening season. Sugar manufacture under ryots' conditions was demonstrated at Anakapalle and Palur.

The apiary at Coimbatore was definitely established and research on various aspects of bee-keeping was started. If this is successful, a further possibility of a cottage industry is apparent.

Breeding experiments in the cross-bred herd of the livestock section have been discontinued, as the progeny in the second and third generations appeared to be reverting to the Scindhi type.

Under the head of demonstration, the number of trial plots and demonstration plots rose from 120 to 130 and 2,132 to 2,733, respectively. It is satisfactory to notice that the ryots' demand for the services of the demonstrators is increasing.

Progress in the adoption of improved methods of cultivation is maintained. The quantity of cotton and paddy seed distributed has increased. But the Director has not indicated, as desired in the Government's review of last year's administration report, the total area constantly cultivated with improved strains or by improved methods to enable any definite estimate to be made of the progress achieved. The new cotton seed scheme inaugurated by the Indian Central Cotton Committee at Tiruppur will make available large quantities of cotton seed.

At the present time, the outstanding requirement of the agriculturist is improvement in marketing facilities. Improvement in the quality or quantity of the crop grown is of no avail if the increased or improved produce cannot find access to markets. A Deputy Director of Agriculture was deputed during the year to study the conditions of the Tanjore district and on his report and,

as the result of further investigations, steps have been taken to reduce railway freights. Other measures to stimulate the rice trade are also under consideration. The aid of the Co-operative Department can be invoked in marketing, as witness the recent development in this direction in respect of groundnut in North and South Arcot. There is abundant scope for developing marketing in this direction. The Government hope that the Agricultural and Co-operative Departments will unite to concentrate greater attention on the question of marketing.

(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.).
" Secretary, Imperial Council of Agricultural Research (with C.L.).
Press.