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ADMINISTRATION REPORT
AGRICULTURAL DEPARTMENT
1951-52.



MISCELLANEOUS.



FOOD AND AGRICULTURE DEPARTMENT

G.O. No. 2007. 26th December 1952

Administration Report—Agricultural Department—1951-52—
Recorded with remarks.

AD—the following paper :—

From the Director of Agriculture, dated 21st October 1952,
No. E-2-Pd. 88/52.

Order—No. 2007, Food and Agriculture, dated 26th December 1952.

The report on the working of the Agricultural Department for the fiscal year 1951-52 submitted by the Director of Agriculture is recorded with the following remarks.

2. *Seasonal conditions.*—The south-west monsoon (June to September) started favourably in the Circars and the West Coast; but it was very disappointing in the Central districts. The position in Anantapur and Chittoor districts was alarming. The north-east monsoon (October to December) was far below the normal throughout the State and aggravated the drought conditions. The rains during the dry weather period (January to March) were inadequate and the second-crop paddy suffered in East Godavari, South Arcot and Singleput districts and parts of Tiruchirappalli and the tank-fed areas Tirunelveli districts. There was acute water scarcity in the Ceded districts and the Central districts. Scattered thunder showers occurred during the summer season (April and May) and benefited the third-paddy in the West Coast and the planting of 'Masipattam' cotton in Southern districts. On the whole, the seasonal conditions have been favourable for agricultural production for the fifth year in a row.

Food production drive.—The Three-Year Intensive Cultivation Plan was merged into the Five-Year Plan of the Planning Commission. The year under review was the final year of the Three-Year Plan and the Five-Year Plan. The target of additional production for attainment during the year through agricultural schemes was 2,294 tons. The following agricultural schemes worked during the year were continued during this year also, namely, extension of irrigation by tractors and bull-dozers, mechanical aids for

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lift irrigation by supply of oil engines, electric motors and river pumping installations, supply of manures, improved seeds, iron and steel, propaganda and publicity and control of pests and diseases of crops. Under the scheme of mechanised cultivation an area of 51,983 acres was brought under cultivation by utilizing 293 departmental tractors (154 with bull-dozer attachments) as against 66,720 acres brought under cultivation during the previous year by means of 268 tractors (136 with bull-dozer attachments). One thousand two hundred and one oil engines and 191 electric motor pump sets were issued to ryots under the hire-purchase system which has become popular as against 1,075 oil engines and 189 electric motors distributed during the previous year. One thousand one hundred and seventy-nine oil engines and 546 electric motors were hired out to ryots as against 706 oil engines and 555 electric motors during the previous year. Under the scheme of distribution of manures the targets and the quantities distributed for application to food crops during the year as compared with the quantities distributed during the previous year are as follows:—

	Quantity distributed in 1950-51.	Targets for 1951-52.	Quantity distributed in 1951-52.
	TONS.	TONS.	TONS.
Ammonium Sulphate	78,638	116,000	80,401
Super Phosphate	12,203	28,000	11,208
Rural compost	95,983	104,706	90,745
Urban compost	131,366	232,000	165,527

Under the seed distribution scheme the figures were as follows:—

	Quantity distributed in 1950-51.	Targets for 1951-52.	Quantity distributed in 1951-52.
	TONS.	TONS.	TONS.
Paddy	1,211	14,724	11,211
Millers	301	1,977	686
Pulses	3	101	65
Green Manure	728	3,071	1,469

Though there has been improvement over the previous year's work in the distribution of improved seeds, the results are far below the targets fixed and disappointing. As this scheme is a very important one in the food production plan, the Director of Agriculture is requested to institute a more vigorous drive and see that the targets fixed are reached in future years and pure viable seeds are made available to cultivators. The schemes of the Agricultural Department mentioned above have been estimated by the Commissioner of Food Production to have produced 2.73 lakhs tons of additional foodgrains against the target of 3.78 lakhs tons. The corresponding figures for the previous year were 2.58 lakhs tons and 3.71 lakhs tons, respectively. In addition to these schemes, the scheme for the control of pests and diseases covered 785,628 acres of food crops, 80,775 acres of other crops and 408,479 fruit and economic plants, preventing an estimated loss of 21,674 tons of foodgrains. The corresponding figures for the previous year were 518,841 acres, 62,600 acres, 21,996 tons and 389,439 plants respectively.

4. *Cotton extension plan.*—The cotton extension scheme continued to be in force during the year as part of an All-India plan for increasing the production of cotton. The plan aimed at an increased production of 155,000 bales of cotton during the year. The main

lines of extension work were reclamation of fallow lands for raising cotton, diversion of certain lands under food and other crop to cotton, double and inter-cropping of cotton with commercial crops, application of fertilizers and distribution of improved seeds. The total estimated production of cotton in the State during the year is 3.6 lakhs bales as against 3.38 lakhs bales during the previous year. Thus the additional production achieved during the year is 22,000 bales which falls far short of the target of increased production of 155,000 bales. Although increase in area could be achieved as a result of the Cotton Extension Plan, the targets of yield could not be reached owing to the failure of rains and lack of water in wells which were responsible for poor acre yields.

5. *Agricultural education.*—One hundred and twenty-three graduates passed out of the Agricultural Colleges, Coimbatore and Bapatla. The number of admissions to each of the two Agricultural Colleges was raised from 80 to 96. The number of applications for admission into the two Agricultural Colleges fell to 433 from 466 in the previous year. The third session of the Diploma course in Horticulture was completed and all the 20 students who attended the course passed out successfully. The question of affiliating the course to the Madras University is under the consideration of Government. All the four Agricultural Labour Schools at Anakapalle, Samalkot, Palur and Coimbatore were closed down during the year for want of sufficient strength in the schools and as the few children in the farms could attend the municipal or district board schools in the neighbourhood. Out of 12 ryots selected for vocational training in dairy husbandry for one month, only five joined the training. The scheme has been ordered to be discontinued for lack of sufficient response from ryots. The question of giving intense practical training to students of the Agricultural Colleges for a full crop season in order to fit them for practical agriculture was under the active consideration of Government. The matter was discussed with the Vice-Chancellors of Madras and Annamalai Universities and a scheme was formulated. The general question was taken up by the All-India Council for Agricultural Education set up by the Government of India. The matter is still under consideration. The question of opening an extension wing in the Agricultural College, Coimbatore, with the aid of the Ford Foundation of America was under consideration. The question is still under correspondence with the Government of India. Instructions were issued to arrange for extension work by the students of the Agricultural Colleges in the neighbourhood of the college during holidays, not as part of the curriculum of studies but purely as a voluntary service. The Agricultural College and Research Institute, Coimbatore, was selected by the Food and Agricultural Organization for the International Soil Fertility Training Centre which was conducted from July to October 1952.

6. *Agricultural research.*—The work in the several research sections of the department has been satisfactory. Soil studies regarding the reclamation of alkaline lands in the Cauvery-Mettur Project area have shown that the soils lack in nitrogen and can be reclaimed and made fertile by heavy dressing of green leaf. Experiments have also shown that heavy or light irrigations did not affect the salt concentration in the top layers in the black soil of the Tungabhadra Project area and hence there is no fear of rise of salts to the surface by irrigation. Some studies of the foliar diagnosis of nutrient elements in the soil were also started. The research workers of the department should bear in mind

that their activities should be concentrated towards the problems of increased production of foodgrains, cotton and sugarcane as part of the Five-Year Plan. The Research Council should keep a vigilant watch and direct all the energies and resources of the department in the right channels with the above object in view. In future reports, the Government would like a more clear statement of the objects of the several items of research, the progress achieved and the results that have been passed on to agriculturists for adoption. The Director of Agriculture is requested to give attention to this part of the Report being written from the correct angle in the next year with the assistance of the Headquarters Deputy Director of Agriculture (Research) who is expected to be in close touch with the research programme and progress of work.

7. *Crop improvement.*—In the last year's Report mention was made that improved strains of paddy had covered 60 per cent of the area under paddy. The present Report does not contain information regarding the increase in the above percentage during the year. The entire paddy area should be covered by improved strains as early as possible under the Five-Year Plan and the percentage of the area so covered every year should always be mentioned in future Administration Reports. Seven improved strains of paddy found promising in district trials during the year were released for distribution. These strains are expected to benefit about a lakh of acres. The evolution of suitable strains for submergible areas covering about 2 lakhs of acres in the State was in progress at the newly opened Rice Research Station at Pulla in West Godavari district. Five new millet strains were released for distribution during the year. One strain of groundnut (T.M.V. 4) and an improved strain (M.U. 2) of Uganda cotton which has been very popular were released. There is nothing worth mentioning on the breeding work in other crops. Studies in the pre-soaking of seeds in nutrient solutions to increase yield were conducted with encouraging results, but they are still in the laboratory stage. In future, the Director of Agriculture is requested to give as a separate appendix to the Report a statement showing the new strains evolved in all crops, their special features and the dates of their release. Similarly a statement for the varieties of seeds and quantities multiplied in the seed multiplication schemes and the quantities sold should be included. Frequent changes in the strains of cotton seeds proposed for multiplication have been noticed. It is desirable that the strains should be carefully selected at the very beginning after adequate trials.

8. *Crop sampling.*—During the year under review crop-cutting experiments were conducted on paddy, cholam, cumbu, ragi, castor, gingely and groundnut. In regard to paddy, 2,540 crop-cutting experiments were planned and 2,361 were finalized during the year. The average yield of paddy per acre according to these experiments is estimated at 1,397 lb. of paddy. Based on this average yield the total production of paddy in the State during the year is estimated as 6,151,500 tons as against 6,031,500 tons estimated in the final official forecast. (The corresponding figures for the previous year were 6,360,000 tons and 6,045,000 tons respectively.) As regards millets, 4,536 experiments were planned and only 1,946 experiments were completed during the year. It is reported that, apart from natural causes, the failure of such a large number of experiments was due to lack of adequate interest on the part of Revenue subordinates. The

Board of Revenue is requested to issue necessary instructions to the Revenue subordinates to co-operate with the staff of the Agricultural Department in carrying out this important work.

9. *Agro-industries.*—The Government Malt Factory at Coimbatore worked at some profit for the second year in succession. But there was heavy accumulation of malt product manufactured in the factory due to the absence of an easy market in competition with the lower priced foreign products. Difficulty was also experienced in procuring good quality cholam seeds for malting purposes at economic price and on account of this difficulty the factory had temporarily to suspend work from June 1952. During the year under review, a permanent departmental farm for Ergot production was opened in the Nilgiris instead of subvention farms on ryots' lands. Under apiculture, it is observed that only 3,110 hives were maintained during the year as against 8,492 hives during 1950-51 and 12,222 hives during 1949-50. Though lack of bee pasturage due to drought through successive years may be the chief cause of this deterioration, the department should take effective steps to increase the number of bee-hives in areas where the necessary bee pasturage exists and develop this useful agro-food industry. The Fruit Products Laboratory at Kodur continued to do experimental work on the manufacture of fruit products. The canning equipment was not set up owing to some cause or other and work on a pilot factory stage was not commenced. Of the five model orchard-cum-nurseries ordered to be opened in March 1950, only two orchards at Poddapuram and Periakulam have been opened; lands have been acquired for two orchards at Thimnapuram and Mangalore and land acquisition was progressing for the orchard at Cuddalore. The progress has been slow. The Government would like these nurseries to be set up in all the five places with the least possible delay.

10. *Agricultural Engineering.*—The Agricultural Engineering Branch was engaged in arranging supply of implements, oil and electric-driven pumpsets and mechanical cultivation units, such as tractors and bulldozers. The application of mechanical aids considerably helped to increase food production and there is increasing demand for them from ryots. As already mentioned in the paragraph relating to food production drive it is unsatisfactory to observe that 293 tractors owned by the department brought under cultivation only 51,983 acres of land during the year as against 66,720 acres reclaimed during the previous year, with the aid of 268 tractors. This low outturn of tractors calls for immediate attention. The review of the several periodical reports received during the year has also shown that the working of tractors has been far from satisfactory. The Government have asked the Joint Director of Agriculture separately to review the whole position personally and submit his views for improving the present state of affairs. He has recently been relieved of his non-engineering work like the distribution of fertilizers so that he may concentrate on the engineering work. The Government expect a better outturn from the tractors and it is hoped that the next report will be more satisfactory. The hiring of tractors by the department has popularized their use. Including those owned by private individuals and institutions, there were in all 624 tractors in the State during the year as against 572 units during the previous year. Six landholders were supplied with a tractor each under the hire-purchase system.

Two co-operative societies in Nellore district acquired tractors and took up contract ploughing for ryots. Demonstration of tractor attached with the new 'Rotovator' was conducted successfully in the districts of Chingleput, Chittoor, Tanjore, Nellore, Krishna, North Arcot and South Arcot. Besides the existing tractor workshops at Coimbatore and Bapatla, a new tractor workshop has been ordered to be opened at Bellary. A Hand Book of Instructions for the Maintenance of Tractors and Tractor Operated Machinery was printed and distributed among the operating staff. Two river pumping schemes in Chingleput district and one in South Kanara district worked successfully. Another scheme in South Kanara district, one in Malabar district, two in Chittoor district and one in Ramanathapuram district have been sanctioned. It has been decided that in future, river pumping schemes should be organized and worked by co-operative societies. Another line of activity that gained popularity during the year was the setting up of filter point tube-well pumping. In order to enable ryots to raise early nurseries for the Kuruwai season in Tanjore district and also to raise cotton or groundnut in the rice fallows during the off season, the Government sanctioned the erection of 100 filter point tube-wells and 50 of them were completed before the end of the year. It is proposed to extend the tubewell scheme to the delta regions of South Arcot, Nellore, Guntur and Godavari and to the Pennar and Vaigai regions. The Director of Agriculture should see that the wells are put up in suitable soils as a large percentage of the wells put up already were unsuccessful due to clayey soils. It is also important to see that the filter points do not fail within a short time after initial success. Besides the several items of engineering service rendered to the ryots as detailed above, the Engineering Branch was also engaged in research on agricultural engineering at the Research Engineering Workshop, Coimbatore. The work of improving the indigenous agricultural implements and designing new ones in the light of modern developments in agricultural machinery to suit the conditions of the State is a very important work and it should engage greater attention of the Joint Director of Agriculture. In Government Memorandum No. 62269-M/52-5, Food and Agriculture, dated 11th December 1952, the importance of this problem has been emphasized and he has been told that the Agricultural Engineering section in Coimbatore should conduct more research according to a planned programme. He has also been requested to draw up a programme, submit it to the Research Council if it has not been already done and submit to Government a copy.

11. *Propaganda, Publicity and Extension work*.—During the year under review only about 6,644 demonstration plots were laid out by the district staff in ryots' holdings as against 10,296 during the previous year. For the whole State which comprises of about 30,000 villages, the number of demonstration plots mentioned above is inadequate and disappointing despite of repeated criticisms on this point. The target to be aimed at should be at least one demonstration plot for each village. The progress in this direction will be an indicator of the intensity of the extension work done by the department. The Government must insist on a better record in the next year. The Director of Agriculture is requested to pay special attention to this. Agricultural Extension Service was sought to be given further impetus by the appointment of a Joint Director of Agriculture (Extension) and the formation of Village Advisory Committees and Agricultural Associations

to help the rapid introduction of improved agricultural practices over larger areas. A programme of extension work was approved by Government in G.O. Ms. No. 1018, Food and Agriculture, dated 23rd June 1952. Extension work is essentially an educational programme for inducing the ryots to do and not merely to know things and so the practical aspect of extension work and the method of approach should be continually kept in the mind of the extension workers of the department. The Joint Director of Agriculture (Extension) should intensify the various items of work included in the above programme. The preliminary reports of the extension work submitted by the Director of Agriculture did not indicate that there was any new orientation in approach or increased activity. It is hoped that the work will gain greater intensity in the next year. The scheme of Honorary Propagandists tried by the Commissioner of Food Production for increasing food production was given up as the proper type of enlightened ryots were not forthcoming to work it. The Registered Model Farms organized by the Commissioner of Food Production were also given up. There is therefore all the more need for greater propaganda and demonstration by the agricultural staff. As the newly formed village multi-purpose co-operatives have taken up the work of distribution of manure and iron and steel, the district staff can now pay more attention to its legitimate work of propagating and popularizing improved agricultural practices. The Grow More Food monthly journals in the regional languages continued to be very popular and 106,819 copies were circulated towards the close of the year. At the instance of Government a number of illustrated popular brochures on principal crops were got printed and made available to the public at a nominal price of annas 3 a copy. The department took part in 201 exhibitions held during the year.

12. *Agricultural Marketing*.—The main items of work of the marketing section were survey of new products, revising the market reports already published rendering help in grading commodities, organizing regulated markets, furnishing market information on important agricultural commodities and giving advice and help in marketing agricultural produce. A new grading station for ghee was opened at Ongole during the year. New market committees were constituted in Tirunelveli district for cotton and in Ramanathapuram district for cotton and groundnut. Including these, there are now 13 regulated markets and 5 grading stations in the State. South Arcot has been declared to be a notified area for cotton also. It is proposed to declare Tiruchinappalli district as a notified area for tobacco and groundnut and North Arcot district for groundnuts. The misconceptions about the purpose of the Madras Commercial Crops Markets Act are dying down but there is still need for propaganda and education by the marketing staff. With the gradual relaxation of controls, there is again considerable scope for grading of agricultural produce and their purchase and sale through regulated markets. The Cotton Certification Scheme was working satisfactorily. The sugarcane price regulation was satisfactory, except for a complication in the Pugalur Sugar factory as a due to the breakdown of the machinery.

13. *Finance—Expenditure on Loans*.—The expenditure on Agriculture under the head '40. Agriculture' during the year increased to Rs. 316.49 lakhs as against Rs. 275.35 lakhs during the previous year. An increase of about Rs. 24 lakhs in expenditure was due to seed multiplication

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schemes, control of crop and plant protection, multiplication and marketing of cotton seeds and demonstration and propaganda. The Agricultural Engineering activities accounted for an increase of about Rs. 13.4 lakhs. The receipts under the head 'XXIX. Agriculture' during the year were Rs. 110.95 lakhs as against Rs. 117.95 lakhs last year. The decrease in revenue was due to the fact that the receipts in 1950-51 included a large recovery from the Central Government on account of grants for food production schemes. The department distributed Rs. 31.51 lakhs as interest-free loans to ryots for the purchase of manures and seeds and Rs. 0.19 lakh for agricultural implements as against Rs. 21.97 lakhs for seeds and manures and Rs. 0.29 lakh for agricultural implements in 1950-51. Besides, under the intensive manuring scheme a sum of Rs. 71.03 lakhs of interest-free loans repayable at the end of the harvest season was granted as against Rs. 61.36 lakhs during the last year. In the last year's review, the Government suggested that the work of providing agricultural credit by loans and advances done by the Revenue, Agriculture and Co-operative departments should be integrated and that the Director of Agriculture and Registrar of Co-operative Societies should be in close touch. No action appears to have been taken on this suggestion. The Government will be glad if the Board of Revenue will submit a comprehensive report on the provisions likely to be made available to agriculturists under (1) takkavi, (2) grow more food advances and (3) co-operative credit under long, medium and short term categories.

14. *Administration and supervision.*—As directed in the previous review, the Director of Agriculture has included a paragraph on the inspection and supervision by Superior Officers of the offices of the Subordinate Officers. But the paragraph would be more useful if it contained more details regarding the adequacy or otherwise of tours, audits and inspections and the general efficiency and discipline. It has come to the notice of Government that the verification of stores and stocks are not systematically checked in strict accordance with the provisions in the Departmental Manual and the Madras Financial Code. It is the duty of the Head of the Department to see that the provisions are enforced and not to give any scope for irregularities or malfeasance.

15. *General.*—The record of work of the department during 1951-52 is on the whole satisfactory. The achievements would have been more striking but for the adverse seasonal conditions. The Government attach considerable importance to research and extension. The number of demonstration plots laid out by the district staff in ryots' holdings should be considerably increased with the object of having at least one plot for each village. The village associations formed should be made effective instruments for advisory service. Special attention should be paid to the work in the community project areas, selected firkas for rural development and also areas worst affected by disasters like drought or cyclone. All possible methods should be devised to increase the outturn and efficiency of the tractor service. Greater attention should be paid by the Regional Deputy Directors to guide and supervise the work of subordinate officers. The Government expect all officers to work in a team spirit to achieve the best results.

16. *Preparation of the report.*—The facts and figures given in the chapter on intensive cultivation schemes have been checked and brought up to date by Government in consultation with the Board of

Revenue (Food Production). The Director of Agriculture is requested to consult the Commissioner of Food Production in preparing the chapters on intensive cultivation schemes and agricultural engineering activities before submitting his report to Government in future. A statement showing the results of crop-cutting experiments on paddy, first, second and third crops of 1951-52 has been obtained from the Director of Agriculture and appended to the report. The first chapter of the Report containing the special features of the year shows improvement over that of the previous year. The presentation of the chapter on intensive cultivation schemes could be improved by giving more details about the special features of the several intensive cultivation schemes and the difficulties met with in executing them and the steps taken to overcome them instead of merely enumerating the facts and figures contained in other parts of the report. The chapter on research can be made more informative by stating specifically the results achieved and their application and usefulness in practical agriculture. It is observed that the work done on potato, fodder, grasses, tobacco and jute are not mentioned in the report. The Director of Agriculture is requested to bear these suggestions in mind while preparing his next report.

17. *Conclusion.*—The Government have decontrolled foodgrains. The Agricultural Department will be expected to do its best to increase production under this favourable circumstance. The Tungabhadra and Lower Bhavani Projects will be completed soon to bring larger areas under assured water-supply. The Five-Year Plan has been finalised and the resources available and results expected will be unambiguously known. The next few years will be a testing time for the Department of Agriculture. The Government expect it to rise to the occasion.

(By order of the Governor)

R. M. SUNDARAM,
Secretary to Government.

To the Director of Agriculture, Madras.
 " Joint Director of Agriculture.
 " Director of Animal Husbandry.
 " Registrar of Co-operative Societies.
 Copy to the Inspector of Municipal Councils and Local Boards.
 " Chief Engineer (Irrigation).
 " Board of Revenue (Civil Supplies).
 " Board of Revenue (Land Revenue).
 " Food and Agriculture (Food Production) Department.
 " Office of the Economic Adviser.
 " Public Works Department.
 " Revenue Department.
 " Development Department.
 " Government of India, Ministry of Food and Agriculture, New Delhi.
 " Director of Information and Publicity.
 " Superintendent, Government Press.

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From

M. S. SIVARAMAN, Esq., I.C.S.,

DIRECTOR OF AGRICULTURE,

MADRAS-5.

To

THE SECRETARY TO GOVERNMENT,

FOOD AND AGRICULTURE DEPARTMENT,

FORT ST. GEORGE, MADRAS.

SIR,

[Administration—Agricultural Department—Report for
year ending 1951-52—Submitted.]

I. SPECIAL FEATURES OF THE YEAR.

FIVE-YEAR PLAN.

The Planning Commission after studying the development plans of the Central and State Governments suggested the formulation of the five-year plan. The States drew up a plan of development suited to their local conditions and fixed targets for each of the scheme included in it. The available resources—financial, technical and administrative—have been concentrated in a limited number of schemes and targets easy of attainment, have been fixed. Among the agricultural schemes, those which go to increase the production of food-grains, in a relatively short period and subsidiary schemes which supply the necessary equipment as a complement to the main schemes have been formulated.

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The main agricultural schemes included under the Plan are—

- (1) Mechanical cultivation through tractors.
- (2) Land improvement through contour bunding, etc.
- (3) Supply of power pumping outfits and tube wells.
- (4) Distribution of manures and fertilizers.
- (5) Distribution of improved seeds.
- (6) Plant protection.
- (7) Cotton extension.
- (8) Sugarcane development.

Details of targets and expenditure for five years are given in Appendix I. Greater stress has been laid on food production by improved methods of agriculture and extension of irrigation. Many of the schemes are a continuance of the existing intensive cultivation schemes. Seasonal conditions remaining normal, the targets fixed are easy of attainment.

The recommendation of the Planning Commission are under close examination and it is hoped that the several development schemes of the State will get a high priority in the supplemental plan of the Commission.

The successful operation of the plan depends upon the financial resources provided by the State and Central Governments and the co-operation and enthusiasm evinced by the cultivators.

COMMUNITY DEVELOPMENT PROJECTS.

Under the Indo-U.S. technical co-operation agreement, the Government of India decided to start 55 community Development Projects in selected areas in various States. In Madras State the following six centres have been selected.

- (1) Coimbatore—Lower Bhavani Project area.
- (2) East Godavari—Kakinada—Peddapuram.
- (3) Kurnool—Cuddapah—Kurnool.
- (4) Mathurai—Nilakottai—Melur—Mathurai.
- (5) Malabar—Malampuzha Project area—Palghat.
- (6) South Kanara—Karaikal—Mangalore.

Each project area will comprise approximately 300 villages with a population of 200,000 people and a cultivated area of about 150,000 acres. The proposed projects will be of the rural development type including irrigation, application of manures, agricultural extension, co-operation health measures and education. The schemes are yet to be finalised.

CROP YIELD COMPETITIONS.

The crop yield competition in paddy which was popular, was continued during 1951-52. The district prizes are being awarded and the State prize is yet to be announced.

In the yield competition in sugarcane, 485 competitors were enlisted but actually 268 plots were recorded. The State prize was declared for a cultivator in Samalkota who recorded a yield of 102 tons 820 lb. (cane) per acre.

TUBE WELL SCHEME.

For successful cropping of the fallow lands in the rice fields of delta areas, irrigation facilities are necessary. These areas possess plenty of subterranean water supplies and the tube well scheme for sinking 100 tube wells with filter points was launched in Tanjore district. The scheme became very popular and successful and over 60 tube wells have been installed and the concerned rice fallows cultivated with crops as P. 216 K. cotton, groundnut, etc. These wells will also enable the cultivators to raise their kuruvai nurseries earlier.

JOINT DIRECTOR OF AGRICULTURE FOR AGRICULTURAL EXTENSION.

A new post of the Joint Director of Agriculture for Agricultural Extension work was created from 1st April 1952. This was done to intensify the Agricultural Extension work in the State. The officer will be in general charge of all Agricultural Extension work of the department under the Director of Agriculture and will be also responsible for the Agricultural Extension work in the six community development—project centres, in the State.

II. ADMINISTRATION AND INSPECTION.

(1) ADMINISTRATION.

1. Sri M. S. Sivaraman, I.C.S., took charge as Director of Agriculture on 2nd June 1951 and continues in the post.

2. Sri B. M. Lakshminipathy continued as Joint Director of Agriculture (Engineering) throughout the year under report.

3. Sri M. Kanti Raj continued as Headquarters Deputy Director of Agriculture (Propaganda) till 19th July 1951 when he was deputed to Canada as Leader of the Indian Technical Mission under the Colombo plan. He returned from Canada and rejoined duty as Headquarters Deputy Director of Agriculture (Propaganda) on 22nd October 1951. He continued in that post till 31st March 1952. From 1st April 1952 he assumed charge as Joint Director of Agriculture (Extension). The post of Headquarters Deputy Director of Agriculture (Propaganda) was kept in abeyance for a period of one year from 1st April 1952.

4. Dr. K. C. Naik continued as Headquarters Deputy Director of Agriculture (Research) and Sri V. K. Subramania Mudaliar as Headquarters Deputy Director of Agriculture (Inspection) throughout the year under report.

AGRI. A. B.—1A

5. Sri V. Rangachari was the Personal Assistant till 6th October 1951 when he proceeded on leave preparatory to retirement, handing over charge to Sri T. Natarajan, Gazetted Assistant who was in additional charge of the post till 18th November 1951. On 19th November 1951 Sri W. G. Janakiraman, assumed charge as Personal Assistant and continued till 21st February 1952 (afternoon) when he handed over charge to Sri V. Venkatrayudu, who continues in the post.

6. The following posts in the Madras Agricultural Service were made permanent during the year :—

(i) Superintendents, Agricultural Research Stations, Maruteru, Palur, Tindivanam, Aduthurai, Nanjanad and Hagari from 1st April 1952.

(ii) Superintendent, Agricultural Research Station, Koilpatti from 14th April 1952.

(iii) Superintendent, Agricultural Research Station, Samalkot from 9th October 1952.

(iv) Superintendent, Agricultural Research Station, Tirukkuppam from 1st March 1952.

Consequently the cadre strength of the Madras Agricultural Service was increased to 104 on 30th June 1952.

The following officers were on other duty under other departments :—

Sri K. Rama Rao, District Agricultural Officer as Special District Agricultural Officer for localisation of ayacut, Tungabhadra project, Bellary from 1st December 1950.

Sri C. Annamalai, District Agricultural Officer, as Special Officer for propaganda for food production, Civil Supplies, Madras from 11th May 1951.

Sri D. Viswanatha Reddi, Deputy Director of Agriculture as compost Development Officer under the Inspector of Local Boards and Municipal Councils from 23rd September 1950.

The following Agricultural Entomologists of the Department have been working in the Civil Supplies Department from dates noted against each :—

Sri M. S. Kylasam as Agricultural Entomologist (Storage), Civil Supplies, Coimbatore, from 20th December 1950.

Sri K. Brahmachari as Agricultural Entomologist (Storage), Civil Supplies, Tiruchirappalli, from 26th November 1947.

Sri C. Krishnamurthi as Agricultural Entomologist (Storage), Civil Supplies, Vijayavada, from 20th December 1950.

Sri P. S. Krishnamurthi as Agricultural Entomologist (Storage), Civil Supplies, Madras, from 5th August 1946.

Officers working under the Government of India and on Foreign service.

1. Sri S. Sundaram, Assistant Cotton Specialist, as Agronomist under the Indian Coffee Board from 1st December 1947.

2. Sri V. Margabandhu, Agricultural Entomologist as Assistant Director of Inspection, Madras, under the Government of India from 5th August 1946.

3. Sri S. Madhava Rao, Curator, as Garden Superintendent, Archeological Department, Ministry of Education under the Government of India from 28th October 1949.

4. Sri I. Kurma Rao, District Agricultural Officer on foreign service under K.C.P., Limited, Vuyyur.

5. Sri K. Kanhikannan Nambiar, Superintendent, Agricultural Research Station, on foreign service as Secretary, Indian Central Arecanut Committee, Kozhikode, from 25th October 1949.

6. Sri D. Achutharama Raju, District Agricultural Officer, on foreign service as Secretary, East Godavari Coconut and Tobacco Market Committee, Rajahmundry, from 24th February 1951.

7. Sri M. P. Narasimha Rao, Superintendent, Agricultural Research Station on foreign service as Secretary, Krishna District Groundnut and Tobacco Market Committee, Vijayavada, from 30th August 1951.

8. Sri C. M. John, Principal, Agricultural College, on foreign service as Director Cum Coconut Specialist under the Indian Central Coconut Committee from 1st December 1950.

9. Sri P. Seshadri Sarma, District Agricultural Officer on foreign service as Secretary, Bellary Cotton and Groundnut Market Committee from 1st June 1951.

10. Sri E. J. Verghese, Assistant Agricultural Chemist as Analytical Chemist in the Central Coconut Research Station, Kasargod under the Indian Central Coconut Committee from 21st August 1951.

11. Dr. S. Krishnamurthi, Curator, Government Botanical Gardens, Ootacamund, as Professor of Agriculture, Annamalai University from 26th July 1951.

12. Sri C. P. Raju, Assistant Agricultural Engineer (Research) as Agricultural Engineer under Indian Central Sugarcane Committee from 21st August 1951.

13. Sri K. Sivasankara Menon, District Agricultural Officer as Secretary, Malabar District Coconut and Arecanut Market Committee, Kozhikode, from 4th May 1952.

14. Dr. G. S. Siddappa, Bio-Chemist as Senior Scientific Officer in the Central Food Technological Research Institute, Mysore under the Government of India from 11th December 1950.

New Posts Sanctioned.

1. Joint Director of Agricultural (Extension) from 1st April 1952.
2. Six Sugarcane Inspectors at Nellikuppam, Mathurai, Pugalur, Samalkot, Vuyyuru and Visakhapatnam (sanctioned for the duration of the cutting season).
3. Ten Additional District Agricultural Officers for intensive manuring scheme at Eluru, Kakinada, Vijayavada, Guntur, Nellore, Tanjore, Pattukottai, Tiruchirappalli, Madurai and Tirunelveli up to 30th November 1952.
4. Assistant Agricultural Engineer (Tubewells) Mayuram, Tanjore.
5. Assistant Agricultural Engineer for devising suitable machinery for cultivation and harvesting of groundnut at Coimbatore.
6. Assistant Agricultural Engineer (Soil Conservation) for Famine Relief, at Chittoor.

Shifting of Headquarters of offices.

The Headquarters of the following officers were shifted to new stations as shown below :—

- (1) District Agricultural Officer, South Malabar from Kozhikode to Shoranur.
- (2) Special District Agricultural Officer (Crop Sampling) from Kozhikode to Shoranur.
- (3) Soil Survey Officer from Bellary to Coimbatore.
- (4) Assistant Agricultural Engineer (Inspection) from Vizianagaram to Anakapalle.

(2) INSPECTION.

1. The inspection of subordinate offices is done by the Deputy Directors of Agriculture at Headquarters, Heads of Research Sections and the Regional Deputy Directors of Agriculture. The accounts of all offices are audited by the internal audit staff sanctioned in G.O. Ms. No. 4084, Development, dated 15th August 1947 and G.O. No. 1172, Food and Agriculture, dated 16th June 1950. The Director of Agriculture himself inspected the offices of the Principals of the Agricultural Colleges at Coimbatore and Bapatla.

2. *Inspection by Headquarters Deputy Director of Agriculture.*—The Headquarters Deputy Director of Agriculture (Research) inspected six Agricultural Research Stations, one fruit station, one breeding station, five laboratories with attached field centres, four research centres and seven miscellaneous centres and farms, scientific and research work in progress was checked up and detailed instructions were issued whenever necessary to up-grade research on all fronts.

The Headquarters Deputy Director of Agriculture (Inspection) visited 35 offices and inspected the office work and district work as well and half yearly reports were submitted to Government. The annual district work programme of each of the 27 districts was discussed with the officers concerned and finalised for the year 1952-53.

3. *The Heads of Research Sections.*—The heads of research sections inspected all the subordinate offices under their control except the oilseeds specialist who could inspect only seven out of the eight offices under him due to pressure of work. The research heads examined the technical work in progress by their subordinates and inspected the office procedure as well. Inspection notes were prepared and instructions were issued whenever necessary. They found the programme technical work and office procedure, satisfactory in general.

4. *The Regional Deputy Directors of Agriculture.*—The Regional Deputy Directors of Agriculture visited the offices of the District Agricultural Officers. In their tours they checked up the work of the Agricultural Demonstrators and other subordinate staff as well.

In general they were found the work of subordinates to be satisfactory. In office procedure they reported satisfactory progress though indicating there was still scope for improvement. They also reported inadequacy of office space in most of the subordinate offices specially for storing records. Tours are reported to be adequate and general discipline, good among the subordinate staff.

5. *Internal audit.*—The internal audit staff inspected the offices of 12 District Agricultural Officers, five Deputy Directors of Agriculture, 117 Agricultural Demonstrators, 10 Agricultural Research stations and 50 other offices during the year. Instructions were issued for proper maintenance of accounts whenever necessary. When any grave defect was noticed, general circular instructions to all heads of offices were issued from headquarters. The accounts in the several offices showed considerable improvement after the appointment of the internal audit staff.

III. AGRICULTURAL EDUCATION.

1. *Agricultural Colleges—Admissions.*—The number of applications for admission into the Agricultural Colleges at Coimbatore and Bapatla was 433 in 1951-52. The number of admission into the Colleges was ordered to be kept at 80 exclusive of the reserve quota for other States and inclusive of re-admission of failed students the total number was asked not to exceed 96 in each college.

College work.—The Colleges opened for the second and final year classes on 15th June 1951 for the academic year 1951-52; the first year students were admitted on 22nd August 1951. The following was the strength of the three classes :—

	Coimbatore.	Bapatla.
First year	73	80
Second year	53	78
Third year	78	72

The following statement shows the results of the University examinations held in March-April 1952 :—

	Coimbatore.			Bapatla.		
	Appeared.	Passed.	Per cent passed.	Appeared.	Passed.	Per cent passed.
R.Sc. Ag. I ..	73	64	88	83	50	60
B.Sc. Ag. II ..	59	48	81	81	59	73
B.Sc. Ag. III ..	83	75	90	72	48	61

Three of the final year students passing out of the Bapatla College secured first class. Only a few (35) of the students that passed in April 1952 could be absorbed in the department.

Students' tours.—Besides visiting a number of villages in the vicinity of the College Estate to study rural conditions, the final year students of the Coimbatore College visited Hosur, Mysore and Bangalore while the second year students visited Hospet, Bellary, Vijayavada, Maruteru, Bapatla, Koduru and Ranipet. The final year students of the Bapatla College visited Koduru, Coimbatore, Nilgiris, Bangalore and Hosur, while the second year students visited Maruteru, Rajahmundry, Samalkota, Anakapalle, Vizianagaram, Hagari, Siruguppa and Hospet. The first year students were taken to the Agricultural Research Station, Lam (Guntur).

College Hostel.—The general health of the students residing in the hostel was satisfactory. Vegetarian and non-vegetarian sections were as usual run to cater to the different tastes of the inmates.

The rented hostel buildings at Bapatla were vacated with the completion of the second hostel block.

Students' clubs.—The literary and sports activities of the clubs were continued as in previous years. While the students of the Bapatla Club participated in the inter-University sports sponsored by the Andhra University, the Coimbatore students partook in the Madras University inter-College sports. The annual club days of the Coimbatore and Bapatla Clubs were celebrated on 23rd March 1952 and 16th February 1952 respectively.

Scholarships.—The following scholarships were awarded to the students at the College for encouragement of studies :—

State Scholarships—

	Coimbatore (first year).	Bapatla (first year).
For Backward communities ..	4	5
Merit	2	2

The scholarships awarded during the previous years were renewed in the subsequent years.

	Coimbatore.	Bapatla.
(1) Harijan Welfare department (Madras State) Scholarships	4	4
Scholarships awarded last year were renewed for students in the second and third year classes.		
(2) Scholarships for Scheduled and Backward Classes awarded by the Government of India ..	2	2 (second and final year students).

Besides Dr. Rangachari's and Pentland scholarships were awarded to deserving students of the Coimbatore College.

Visitors.—Besides the members of the Board of Honorary Visitors, the following were among the distinguished visitors to the Colleges during the year :—

Coimbatore—

- (1) Sri K. M. Munshi, Minister for Food and Agriculture, Government of India.
- (2) Sri A. B. Shetty, Minister for Agriculture, Madras.
- (3) Dr. Oppenheimer-Israel, Member, Food and Agricultural Organization.
- (4) Dr. Norris E. Dodd, Director-General, Food and Agricultural Organization.
- (5) Mr. Cummings, Director for South-East Asia, Food and Agricultural Organization.
- (6) Professor, Mangel, Professor of Rockefeller Foundation, New York.
- (7) Dr. Von Dilweijn, Sugarcane Officer, Food and Agricultural Organization.
- (8) Dr. H. G. Dion, Soil Fertility Officer, Land and Water Use Branch, Agricultural Division, Food and Agricultural Organization.
- (9) Dr. J. G. Vermaat, Soil Fertility Officer, Land and Water Use Branch, Agricultural Division, Food and Agricultural Organization.
- (10) Sri D. R. L. Sethi, Agricultural Commissioner, Government of India.
- (11) Sri Vishnu Sahay, I.C.S., Secretary, Food and Agriculture Department, Government of India.
- (12) Sardar Dattar Singh, Vice-Chairman, Indian Council of Agricultural Research.

Bapatla—

- (1) Sri Kala Venkata Rao, Minister for Health, Madras.
- (2) Sri K. Chandramouli, Minister for Local Boards, Madras.
- (3) Sri V. S. Hejmadi, I.C.S., Member, Board of Revenue, Madras.

2. *Diploma course in Horticulture*.—All the 20 students admitted into third session of the course on 12th August 1951 passed out successfully with two securing first class and eight distinction in one or more subjects. The fourth session of the course commenced on the 14th August with 24 candidates of whom 19 were departmental men, three were non-stipendiary science graduates, one each were deputed by Bihar and Hyderabad States. The training was continued to be given on the same lines as in the previous years. Proposals are under examination for extension of the training for two more years and for affiliation of the course with the Madras University.

3. *Vocational training in Dairy Husbandry*.—Training of cultivators in Dairy Husbandry at the Agricultural College Dairy was continued during the year as per Government orders. Twelve candidates were selected of whom only five joined the course and underwent training for one month from 7th May to 6th June 1952 at the end of which an examination was held. A stipend of Rs. 50 was paid to each candidate.

4. *Post-graduate training*.—Sri N. R. Adyanthayya, Assistant in Mycology, and Sri C. M. Bhaktavatsulu, Assistant in Fruits, were deputed for training in Agricultural Statistics for a period of ten months at the Indian Agricultural Research Institute, New Delhi.

Sri T. R. Srinivasan, Assistant in Chemistry, and Sri G. H. Maduram, Assistant in Botany, who were deputed for post-graduate training in 1950 are expected to be relieved in September 1951.

The deputation of departmental candidates for post-graduate training at Indian Agricultural Research Institute has been stopped for the year 1952.

5. *Foreign training*.—Sri D. V. Krishna Rao, Assistant Agricultural Chemist, returned in February 1952 after advanced studies in Soil Science for a period of six months in United Kingdom and Palestine.

6. *Labour schools*.—All the schools were closed during the year.

IV. SEASONAL CONDITIONS.

South-west monsoon period (June-September).—The south-west monsoon started favourably in the Circars and the West Coast but was very disappointing in the Central districts. Heavy rains in July in the Circars caused some damage to the transplanted paddy crop over extensive areas. The monsoon rainfall was far below normal in the West Coast. Conditions were favourable in the rest of the State. Rainfall was below normal in August in West Coast, Ceded districts and the Nilgiris and the distribution was uneven. In September, rainfall was below normal in Guntur,

Chingleput, South Arcot, the Central and the Ceded districts, thus affecting all crops in general. The position in Anantapur and Chittoor was alarming. Heavy rains in September in Madurai and Tirunelveli caused damage to the fully matured first-crop paddy and in the Nilgiris caused "Early Blight" in potatoes. Tetradia and army worm insects infested paddy crop and red hairy caterpillar attacked groundnut crop in South Arcot and parts of Tiruchirappalli in August-September. In South Kanara "Hispa" attack on paddy was rather severe particularly in Mangalore and Udupi taluks. In general the south-west monsoon was not at all encouraging and to a certain extent foreboded distress in Anantapur and Chittoor districts.

North-east monsoon period (October-December).—The commencement of the north-east monsoon was also very discouraging as rains were far below normal throughout the State, thus augmenting the drought in the several districts, where already south-west monsoon had failed. The Carnatic zone comprising Nellore, Chingleput and South Arcot districts received only below 25 per cent of its normal October rainfall, thus affecting water-supply in all the tanks. In the month of November, South Arcot got heavy rains while Chingleput and Nellore remained below normal. Due to want of rains and consequently lack of water for irrigation, paddy nurseries were abandoned in Chittoor and semi-dry paddy was allowed to be grazed in Chingleput district. Rainfall in December was also far below normal in the Carnatic districts and the southern districts, and below normal in the rest of the districts. Dry crops failed in Srikakulam, Kurnool, Cuddapah, Nellore, Chittoor and North Arcot districts and Pudukkottai. In the majority of the districts in the Circars, and in the districts of Bellary, South Arcot (Madurai, Ramanathapuram and Tirunelveli), dry crops fared fairly well, due to favourable rains in November in these districts.

In general the north-east monsoon rainfall was a failure in this State for the fifth year in succession and this has caused distress in most places.

Dry weather period (January-March).—Dry weather prevailed generally over the State in January except for scattered light showers here and there. Harvests were in full swing taking advantage of the dry weather. In February, there were some fairly heavy local showers in the southern districts and also in the Nilgiris. March also experienced dry weather except for a few light showers, especially in Srikakulam district saving mostly dry crops in the district.

During this period second-crop paddy suffered in East Godavari, South Arcot, Chingleput, parts of Tiruchirappalli and the tank-fed areas of Tirunelveli. Soori attack was noticed in the fully matured crop of paddy in Tanjore. Mango hopper attack was severe in Srikakulam and Anantapur districts. In the Nilgiris, frost in January affected crops in general in the plateau taluks:

cutworms and chafer grubs were noticed in February. Due to some good rains in February, sowing of the main crop of potatoe was in full swing in March.

Scarcity for drinking water was felt in the Ceded and the Central districts and relief measures had to be started in this zone, to tide over famine conditions.

Hot weather period (April and May).—Scattered thundershowers occurred, mainly in the Circars, hills and in the southern districts favouring the planting of Masipattam cotton. Dry weather continued during the first 20 days of May and thereafter wide-spread rain with locally heavy falls occurred from 22nd to 26th May due to a cyclonic storm over the Ceded Districts, the Carnatic and the Circars. Widespread light showers occurred in the rest of the region. Even though floods and damage occurred to a certain extent in Kurnool and parts of Nellore and Chingleput districts, the rain helped to relieve distress especially over the Ceded districts. Preparatory cultivation was started over a wide area in the State with the help of the rains. It is expected that the area under Swarnawari paddy will increase to about one lakh of acres in Chingleput district. The thunder rains were beneficial to the third-crop paddy in the West Coast and also the first-crop paddy nurseries. In May, paddy nurseries in South Kanara were reported to have been infested by Spodoptera, Hispa and Thrips.

In the Nilgiris, April rains were favourable to the potato main crop while rains in May were below normal causing drought conditions to potatoe crop.

V. THE INTENSIVE CULTIVATION SCHEMES (1951-52).

Definite targets have been fixed to be reached by the end of 1951-52, the third or final year of the three-year plan. This plan has been since converted into five-year plan, commencing from 1951-52 (the final year of the three-year plan). The first year of operation of the plan was completed on 30th June 1952.

I. Schemes and targets.—The target of additional production of food for the agricultural schemes for 1951-52 is 378,294 tons. The main agricultural schemes are—

(i) (a) Distribution of oil-engines and electric motor pumps for lift irrigation either at controlled rates or on hire-purchase system or on hire at concessional rates.

(b) Installation of river pumping units.

(ii) Reclamation of waste lands by the use of—

(a) Tractors and bulldozers.

(b) Distribution of tractors on hire and hire purchase system.

(iii) (a) Distribution of Sulphate of Ammonia at cost price.

(b) Distribution of Phosphatic fertilizers at half rates;

(iv) Distribution of improved seeds of paddy, millets and pulses.

(v) Distribution of rural and urban compost.

(vi) Distribution of green manure seeds.

(vii) Demonstration of plant protection measures against insect pests and fungus diseases.

II. Irrigation aids.—(1) The department has 743 oil engine, pumpsets for supply to ryots on hire at concessional rates. These are portable pumpsets hired out to ryots at rates covering 50 per cent of the total working cost including wages of the driver. The hire charges per day per set are as follows:—

	Unit of h.p. below 16.	Unit of h.p. 16 and above.
	RS.	RS.
With driver	3	4
Without driver	2	2½

(2) Oil engine and electric motor pumpsets are supplied to farmers on easy instalment payment system. This scheme is popular and the demand for oil engine pumpsets has increased considerably.

(3) Besides these, electric motors are supplied through trade channels and the requisite iron pipes for irrigation are distributed departmentally.

(4) *River pumping schemes.*—River pumping schemes on a pilot scale are in operation in Chingleput district and they have been extended to Malabar, South Kanara, Ramanathapuram and Chittoor districts. The object of these is to investigate the possibilities of lifting water from rivers for irrigation purposes through big pumping units capable of irrigating 50—100 acres. These have since been ordered to be transferred to co-operative societies for execution.

III. Mechanised cultivation.—Reclamation of waste and fallow lands to increase the area under cultivation at moderate cost is done by tractors and bull-dozer with accessory equipment. There are 293 tractors of different types at work in the several districts of the State. There is increasing demand for these units. The puddling of wet land with tractors using the "rotovator" attachment has given promising results. The rotovator is useful not only for puddling wet land but also for incorporating green manure. (The above schemes are discussed in more detail in the section under Agricultural Engineering.)

IV. Supply of fertilizers.—In order to increase the yield per acre of food-crops, the department has been supplying large quantities of nitrogenous and phosphatic fertilizers for manuring grain crops. The nitrogenous fertilizers are sold at cost price and phosphatic fertilizer at 50 per cent of their cost.

Intensive manure scheme.—For the year 1951-52 Government sanctioned a scheme for the intensive distribution of ammonium sulphate and super-phosphate in all the districts except Anantapur.

Special District Agricultural Officers were appointed for granting 'interest-free' loans for the purchase of these fertilizers so that poor ryots might be benefited. This scheme worked in all the districts referred to above and a sum of Rs. 71.02 lakhs was distributed as loans, as against the target of Rs. 87.51 lakhs.

V. (a) *Rural compost*.—A subsidised scheme of rural compost was in operation. Farm wastes like weeds, grass, dried leaves and stubbles of crops were composed and applied to food crops. A subsidy of Re. 1 per ton (50 cubic feet) of compost manufactured was paid to farmers and the maximum subsidy payable for an individual was limited to Rs. 50. Allotment of funds for compost subsidy for South Kanara and Nilgiris districts was made during the year. During 1951-52 about 90,745 tons of compost was prepared and applied to food-crops.

(b) *Urban compost*.—The scheme continued to be under the control of the Inspector of Local Boards and Municipalities. The number of municipalities and panchayats preparing compost increased from 91 and 220 to 97 and 351 respectively. Cochin is the only municipality that has not taken to composting and out of 400 panchayats only 49 have not taken up compost work. The quantity of compost prepared by the local bodies was 285,078 tons as against a target of 232,000 tons and 165,527 tons of these were sold. This quantity is expected to manure 57,016 acres producing 7,127 tons of extra food-grains. Steps have been taken to augment waste material for composting. There was very good demand for compost prepared by the local bodies except in a few cases. Adverse seasonal conditions, transport bottle-necks and ignorance of ryots were inhibiting full utilization of compost prepared. Concessional rates of transport in Agricultural department lorries, issue of takavi loans for purchase of compost, intensive propaganda and layout of demonstration plots were done to popularize urban compost. A film on Wealth from Waste was prepared in Tamil and Telugu and distributed to theatres for exhibition. The sale price of compost was fixed as per the procedure laid down in G.O. Ms. No. 159, Food and Agriculture (Food Production), dated 4th October 1950, by a local committee. The price of a cart-load of compost sold by the local bodies varied from As. 1 to Rs. 3-8-0 depending on local conditions.

VI. *Multiplication and distribution of improved seeds*.—This item of work is given a high place in the Grow More Food Campaign. Supply of improved seeds of paddy, millets and pulse is made in all districts of the State. The increase in yield on account of this factor alone is estimated at 10 to 15 per cent and proper working of this scheme by itself is expected to wipe out the food deficit of this State. Improved seeds produced on Agricultural Research Stations are multiplied in "primary" and "Secondary" seed farms in ryots' holdings. Expenditure on supervision of seed farms, roguing charges and premium to see

farm ryots, is met by Government. The rates of premium paid during the year were as follows :—

	PER CENT.
(a) Short-duration paddy	27½
(b) Long-duration paddy	25
(c) Millets	35

Special interest-free loans to the extent of Rs. 11 lakhs were issued to selected seed farm ryots to induce them to produce large quantities of improved seeds and make their entire surplus available to the department for distribution among ryots. The scheme was started late and it is hoped to distribute more loans in the succeeding year. The seed procured from seed farms was sold at village-site price plus 10 per cent. The premium of 35 per cent payable on improved millet seeds was enhanced to 75 per cent temporarily up to 30th June 1952 in the districts of Cuddapah, Kurnool, Anantapur, Chittoor, Bellary and Guntur, subject to the condition that the amount paid over and above 25 per cent should be recovered through sale price. This was sanctioned as a special case due to adverse seasonal conditions and the difficulty felt in procurement. Improved seeds were arranged to be distributed through village co-operative societies in the districts of East Godavari, Nellore, Guntur, Tirunelveli, Madurai, Coimbatore, South Kanara, and Malabar. The societies will get a commission of Re. 1 per bag of (125 lb.) seeds distributed. Another scheme for distribution of improved seeds through selected seed farm ryots was in operation in the districts of West Godavari, Krishna, Tanjore, Tiruchirappalli and Malabar. One ryot in each taluk of the districts was selected and was paid a commission of Re. 1 per bag of 125 lb. The scheme for exchange of local seeds for improved seeds was continued for the benefit of poor ryots in the districts of Chittoor, North Arcot, South Arcot and Chingleput.

The seeds distributed, area covered and additional production achieved thereby are given in the appendix.

Green manure seed distribution.—Green manuring of paddy is an important phase of crop production. It brings about a number of favourable effects and aids in maintaining and raising the crop-producing capacity of the soil. When there is shortage of farm-yard manure, the practice is of special importance. It was proposed to distribute 3,214 tons green manure seeds during the year but only 1,469 tons could be distributed due to adverse season. Subsidising cultivation of green manure for paddy was done in Tanjore district during 1950-51. Under this scheme green manure seeds were supplied free to ryots growing the crop over a minimum area of 10 acres and they have to hand over three bags or 480 lb. of grain paddy per acre to the procurement staff. About 5,098 bags of green manure seeds were issued free to cover 4,241 acres and a quantity of 12,634 bags paddy seeds were procured during 1951-52.

Sesbania speciosa is a quick growing green manure crop attaining a height of 6 to 10 feet in two to three months with succulent green leaves. It is similar to daincha in respect of soil requirements and yield of green matter. It is not relished by cattle. Nor does it become weedy even if kept very long in the field. With a view to get the entire irrigated paddy area green-manured by the end of the first three years commencing from 1952-53, it has been proposed to concentrate on the distribution of *Sesbania* seed only as green manure seed during 1952-53.

During 1951-52 efforts were made to raise *Sesbania speciosa* plants in all the Research Stations with a view to produce seed for the purpose of distribution during 1952-53. The Agricultural Demonstrators were directed to select at least one leading ryot in each wet land village in each taluk, for intensive popularization of green manure crops and particularly *Sesbania speciosa*. Besides they were asked to enlist the voluntary co-operation of social workers, village leaders, etc., in this campaign to make the use of green manure crop a regular practice all over the wet villages in the State.

This green manure crop is raised in a special manner. Nurseries are raised along with the nursery of long-duration paddy or two to three weeks earlier in case of short-duration paddy varieties and the seedlings are transplanted along field margins 5 inches to 6 inches apart. The plants grow well and give about 6,000 lb. per acre in two to three months. This could be used as green leaf for the succeeding paddy crop. In Tanjore district *Sesbania* is raised along with Kuruvai and the green material is used for the "Thaladi crop" that follows. This practice is intensified in all paddy growing areas where conditions are favourable.

Honorary non-official propagandists.—With a view to carry the latest scientific knowledge about agriculture to the door of the cultivator and educate the ryot in better farming methods, a pilot extension service scheme was put into operation in eight districts during 1950-51 and was continued during 1951-52 also. Twenty-seven honorary propagandists were appointed and 2 actually continued to work during the year. They laid out demonstration plots, organized village agricultural associations and conducted exhibitions and other types of demonstrations. It was found difficult to secure suitable men for the scheme and was therefore closed towards the end of the year. The work done by them is given in Appendix X.

Crop-yield competition.—As an incentive for the intensification of the Grow More Food Campaign and for bringing about improvements in farming practices, a crop-yield competition for paddy raised under any system of cultivation was instituted during the year. Attractive prizes were offered. Harvests of plots entered for competition is proceeding. District prize winners are being announced. The State Prize Winner is yet to be decided for the year 1951-52.

Model farms.—For the propagation of better farming methods among cultivators and for increasing output of crops a scheme of registered model farms at one for each taluk was started during 1950-51 and it was continued during 1951-52 also. Selected farmers were supplied with seeds, manures, etc., at concessional rate to run the model farms to serve as visual examples to ryots in the locality. The upper limit for financial aid was limited to Rs. 250 per individual. Model farms were functioning in all districts till end of May 1952 when the scheme was closed.

Control of pests and diseases.—Prevention and remedial measures against crop pests and diseases form an important aspect of the Grow More Food Campaign. A special staff is employed for this purpose. Insecticides and fungicides were sold to the ryots at half cost to combat pests and diseases affecting food crops.

As a result of working of all the Intensive Cultivation Schemes, which directly contribute to increased production during the year, an additional production of 281,581 tons of foodgrains as against a target of 378,294 tons, has been estimated to have been produced as detailed in the statement given below :—

Particulars of the scheme.	Quantity or number distributed.	Estimated area covered.	Estimated additional production.	Target for 1951-52.
(1)	(2)	(3)	(4)	(5)
		ACS.	TONS.	TONS.
1 Land reclamation by tractors and bull-dozer.	149	44,073	6,069	9,250
2 Distribution of electric motors on hire ..	546	2,730	1,365	7,500
3 Distribution of oil engines on hire ..	1,179	9,432	4,716	1,000
4 Central Agricultural Engineering Stores and Supply Centre—				
(a) Oil engines (on hire purchase system) ..	784	6,272	3,136	6,000
(b) Electric motors (on hire purchase system.)	152	760	380	1,250
5 Rural compost—tons.	90,745	18,149	2,269	2,617
6 Distribution of ammonium sulphate—tons.	102,114	2,859,192	204,228	232,000
7 Distribution of phosphatic manures—tons.	18,036	..	15,032	23,333
8 Distribution of improved seeds—				
Paddy—tons ..	11,211	504,495	27,027	44,167
Millets—tons ..	686	102,900	1,951	18,603
Pulses—tons ..	65	19,396	651	450
9 Distribution of green manure seeds—tons ..	1,469	109,175	14,757	32,224
Total ..	..	..	281,581	378,294

VI. THE COTTON EXTENSION PLAN.

Introduction.—Under the integrated production plan of the Government of India, the Cotton Extension Scheme was put into force in the State in June 1950. The scheme aimed at producing 99,390 additional bales of cotton during 1950-51 as a result of the activities programmed under the Extension Plan. Owing to the unfavourable seasonal conditions and the limited quantities of improved seeds that could be procured, an additional production of 47,390 bales of cotton was estimated to have been achieved. The Cotton Extension Scheme continued to be in force during the year 1951-52 as part of an All-India Plan for increasing the production of cotton. The special scheme for the development of rice fallows in the Cauvery delta was continued during the year.

Season.—The overall seasonal conditions during the year in general over almost the entire State, were far from satisfactory for attaining average yields. Severe famine conditions prevailed in eleven of the districts in part of whole. The Indian Army was on the scene in some of the worst affected districts for purposes of deepening wells and supply of drinking water to interior villages by transport in lorries. In several districts this was the fifth year of drought in succession. Although area increase could be achieved as a result of work under the Cotton Extension Plan, the targets of yield could not be achieved owing to the failure of rains and lack of water in wells which were responsible for poor acre yields.

Extension work.—Under the Cotton Extension Work during the year it was targetted to produce 155,000 bales of cotton. As against this, an extra production of 22,000 bales is estimated to have been achieved. The official estimates of area and production of cotton in Madras State during the year 1951-52 are 16.43 lakhs of acres and 3.6 lakhs of bales, respectively. The area recorded represents an increase of 6.8 per cent over that of the previous year and this is to a large extent attributed to the Cotton Extension Scheme that is being worked in the State. The trade estimates are 3.81 lakhs bales. The estimate of total production during 1950-51, the previous year a comparatively better year was 3.38 lakhs bales. Had it not been for the intense activity under the Cotton Extension Scheme, the area and production during 1951-52 would have been less than what it has been by at least half a lakh of bales.

The following items were tackled during the year under the Cotton Extension Plan :—

- (1) Reclamation of waste land.
- (2) Diversion of area from (a) Rice, (b) Millets, and (c) Oilseeds.
- (3) Double cropping.
- (4) Intercropping with
 - (a) unirrigated groundnuts,
 - (b) unirrigated chillies, and
 - (c) irrigated ragi, groundnut and other crops.

- (5) Distribution of improved seeds.
- (6) Application of fertilizers.
- (7) Adoption of plant protection measures.
- (8) Adoption of improved cultivation methods.

Reclamation of waste lands.—The targets under the Cotton Extension Plan were sought to be achieved through intense propaganda both by the Cotton Extension staff and the regular propaganda staff. Over 4,000 acres of waste lands were reclaimed by tractor cultivation and cotton sown. About 600 bales of cotton are estimated to have achieved under this item.

Propaganda and publicity.—The entire staff of the scheme as well as the normal district staff toured intensively for doing propaganda and for giving publicity for augmenting cotton production in the State as per the approved plans formulated under the scheme for the year. The several items in the Cotton Extension Plan were explained to the cultivators. Many meetings were held, printed leaflets were distributed and wide publicity given through the medium of the Grow More Food Journals and the Press.

Double cropping.—Propaganda for growing cotton in rice fallows was intensified. The Special Agricultural Demonstrators in the area did continuous propaganda for cotton cultivation in rice fallows and for installing tube wells for irrigating the cotton crop. There is a special tube well scheme in the Tanjore district in charge of a Special Assistant Agricultural Engineer. A total of 60 tube wells with filter points were installed during the year. For finding a ready market for the kapas produced in this new cotton area, a co-operative cotton marketing society was registered towards the end of the year and the society was inaugurated at Aduthurai by the Minister for Agriculture. The area under cotton in rice fallows in the Cauvery delta during 1950-51 was estimated to be about 800 acres. During 1951-52 the area is estimated to be over 3,000 acres.

Mixed cropping.—Sustained propaganda was done in favour of mixed cropping of cotton with groundnuts, ragi and chillies as this is an important item in the Cotton Extension Scheme. Wide publicity was given to the fact that "Madras Uganda 1" and "P-216F" cottons are outside the price control and to the existence of the certification scheme run by the Department of Agriculture for benefitting the cultivators to realize proper prices for those cottons. Wide publicity was also given regarding the various concessions offered by Government for encouraging cotton cultivation on an extended scale.

"Moco" cotton was advocated for backyard cultivation and for growing in public gardens, along fence lines in orchards and in school, hospital and jail compounds.

Plant protection.—The cultivators were advised to seek timely aid of the plant protection staff in the case of outbreaks of pests and diseases on the cotton crop. There is a separate scheme for advocating plant protection measures for cotton under the Plant Protection Officer. Use of the "Cotton Dust" specially prepared insecticide was advocated on an extended scale by the Plant Protection staff and large quantities of the pesticides have been sold.

The performance of "Laxmi" cotton in Bellary district under rainfed conditions during the year was reported to be good. Nucleus stock for its multiplication was arranged to be obtained from the Bombay State for its multiplication.

Arrangements are in progress for bringing about 6,000 acres of new land under cotton in the Lower Bhavani Project area.

Distribution of improved seeds.—A total of 45,253 imperial maunds of improved seeds of cotton was distributed during the year under report. These improved seeds consisted of the varieties Cambodia 2, Madras Uganda 1, Karunganni 2, Karunganni 5, Westerns 1, Cocanadas 881F, P.216F, Laxmi and H420. During the year a total of 5,000 imperial maunds of seed of P.216F and of 2,500 maunds of H.420 cotton seed were procured from East Punjab and Madhya Pradesh, respectively, by deputing one Assistant Cotton Extension Officer and sold to the cultivators for purposes of sowing as pure and mixed crops. Vigorous propaganda was made for the use of these improved seeds.

Sale of fertilizers.—The fertilizer largely used for the cotton crop is ammonium sulphate and this was distributed through co-operative societies and tender firms. Vigorous propaganda was made for the application of the manure.

Cotton Extension Plan for 1952-53.—The details of targets of area and production under the Cotton Extension Plan for 1952-53 were worked out and the scheme submitted to Government for sanction. A special feature of the scheme was the non-diversion of areas from rice and other food-crops.

VII. RESEARCH.

The research work of the Agricultural Department is carried on mainly at the Agricultural Research Institute at Coimbatore. Besides, research on regional problems is carried on at the 37 research stations and other centres in the districts. The research work done is reviewed under the following heads :—

- (1) Research Council.
- (2) Agricultural Chemistry.
- (3) Plant Physiology.
- (4) Agricultural Entomology.
- (5) Agricultural Mycology.

- (6) Agricultural Meteorology.
- (7) Crop improvement.
- (8) Systematic Botany and Botanic gardens.
- (9) Cytogenetics.
- (10) Agricultural Engineering.
- (11) Agro-Industries.
- (12) Agricultural Research Stations.

1. RESEARCH COUNCIL.

The Research Council consists of heads of different research sections. It examines the programmes and progress reports on investigations and schemes in operation. Twenty-nine meetings of the Research Council were held during the year and the following items were scrutinized :—

- (a) Reports of research sections.
- (b) Cropping schemes and annual reports of Agricultural Research Stations.
- (c) Half-yearly progress reports.
- (d) Schemes submitted by Research Officers.

2. AGRICULTURAL CHEMISTRY.

(1) *Analytical and advisory work.*—This constitutes one of the largest and important phases of the activities of the Agricultural Chemistry section. Analysis of soils, manures, foodstuffs, fodders, irrigation waters, sugarcane juices and other materials for departmental officers, other Government departments, manure firms and the general public were undertaken. In all, 2,679 samples of various kinds were received, as against 1,887 samples in the previous year and advice given, as per details given below :—

Nature of sample.	Agricultural department.	Other Government departments.	Private parties.	Total.
Soils	1,273	23	64	1,360
Manures	114	51	231	396
Foodstuffs and fodders ..	5	9	1	15
Plant products including grains straws.	549	65	..	614
Waters	34	..	19	53
Miscellaneous	197	44	..	241
Total ..	2,172	192	315	2,679

The receipts from analytical fees amounted to Rs. 4,953 as against Rs. 3,649 of the previous year.

Among the various items analysed special mention may be made of *Sesbania bhusa* (husk) which was found to be as good as horsegram hay, Agathi seeds were found to compare favourably with cotton seed meal, samples of foodgrains received from the Civil Supplies Department, and compost from municipalities and panchayats were examined and reported.

(2) *Research—A. Soils—(i) Rapid tests and their application to the manuring of crops.*—The work on the rapid tests for assessing the plant food ingredients of the soils of the State and the need for manuring these soils for maximum production could not be completed due to the failure of the north-east monsoon and consequent poor growth of crop. It is being pursued for arriving at definite conclusion and standardization of the technique.

(ii) *Studies on Geo-Chemistry of Madras Soils.*—Geo-Chemical studies of the soils of Ramanathapuram, the shell bed areas of Kasaragod, alkaline area near Rajapalayam, were studied in detail.

(iii) *Improvement of marginal lands.*—The experiments were conducted at Koilpatti and Eruvadi, under rainfed and irrigated conditions respectively. At Koilpatti the response to phosphate application was best in pillipesara. It was spectacular under the irrigated condition.

(iv) *Studies on laterite soils (Agricultural Research Station, Pattambi).*—Under this study investigations were carried out in the laboratory, pot culture and field. In the laboratory study it was found that fixation of soluble phosphate was rapid due to the presence of large amounts of iron and alumina in these soils. The finer fractions of soils were also responsible for this reversion. It was found that this could be retarded by the application of plenty of bulky organic matter and lime; and lime by itself was not effective.

The response of rock phosphate and super on the yield of paddy in these soils was studied in pot culture experiments. The indications were that the yield of grain and straw was best due to the application of super, rock phosphate coming second only.

In the field studies, the plots which received higher doses of green leaves and lime and super at 45 lb. (P_2O_5) and 60 lb. (P_2O_5) per acre level have given the best yields. The laboratory study also revealed that considerable reversion takes place during the first one and a half months, but lime and green leaf retarded the reversion of added phosphatic with consequent availability of the added soluble phosphates for assimilation by plants.

(v) *Reclamation of alkaline lands in Caurery-Mettur Project area.*—This study involved work both in the laboratory and in the field. The field trials were conducted at Seethambalpuram. Cheap and easily available ameliorations like lime, gypsum and green leaves were tried. The crop suffered due to the failure of the north-east monsoon. It was found that green leaf at 10,000 lb. per acre not only reclaimed alkalinity of the soil but also increased the crop yield. The yield due to gypsum and green leaf combinations closely followed the application of green leaf at 10,000 lb. per acre. Lime or gypsum alone was not effective.

Trials with alkaline resistant variety of paddy showed that the medium duration variety S.R. 26B was best.

The laboratory studies revealed that the soils of the area are 'Hungry' for nitrogen and organic matter. By continued application of green leaf manure for over a number of years, these soils can be reclaimed and made more fertile.

(vi) *Soil survey for the fruit development in the Ceded districts.*—The field survey was completed and in all 38 profiles were examined and 110 soil samples and ten rock samples were taken. About 490 soil samples have been analysed during the year and the analysis of the remaining samples is in progress.

(vii) *Soil conservation and run-off studies.*—The soils of Ketty Valley were poor in nitrogen and very poor in lime. The data collected from the run-off losses during the hot weather period indicated that losses increased up to the gradient of 1 in 5 and dropped for the other slopes.

(viii) *Irrigation of black soils of the Tungabhadra Project (experiment at the Agricultural Research Station, Siruguppa).*—The effect of light irrigation on the movement of salts in black soils was studied and it was found that all the irrigated plots contained less salts in the top three-foot layer than the pre-irrigation level, namely, far below the toxic value of 0.2 per cent.

The effect of crop rotation on the movement of salts in the black soils receiving light irrigation showed that (1) there was no upward movement of salts, (2) the second and third foot layers were having more of salts than the first foot, and (3) the salt content of all the three-foot layers in all the treatments was far below the toxic level.

The effect of heavy irrigation on the salt movement showed that there is no fear of rise of salts to the surface due to heavy and continued irrigation. There is evidence to show that considerable amounts of salts were being washed down to the lower layers of soil.

Other findings in these studies are—The effect of continued light irrigation on the exchangeable bases showed that there is a decrease in exchangeable bases in all the three-foot layers. Owing to continued heavy irrigation there is a decrease in the exchangeable sodium both in the surface and sub-soils.

The intensive leaching with water of soils as such and soils salanized showed that in both red and black soils desalanization of saline soil resulted in the increase of alkalization. Leaching black soils as such with good water has caused a decrease in the degree of alkalization.

The presence of gypsum layer in the black soil has very little effect on the alkalization of the soils in desalanization since the gypsum is present in the soils in an insoluble state and has little effect on the clay composition.

B. Manuring and plant nutrition.—(1) Permanent manurial experiments (old plot).—Periyamanjal cholam was grown under rainfed conditions. There was poor rainfall during the growing

period. As usual the N.P.K. treatments gave the highest yield of grain followed by N.P. and cattle manure respectively.

In the new plot usually two crops are raised yearly but owing to removal of hariali weed only one crop of panivaragu was raised. The crop was normal. The 'N.P.K.' treatment in the eastern series and the "cattle manure" treatment in the western series gave the highest yields.

In the physico-chemical studies of these soils the tentative conclusions are that the pH in old plot soils was more alkaline in 'N+P', 'N+K+P' than the no manure, P, K, N and P+K plots. The cattle manure and cattle manure residual plots were most alkaline.

Biological properties of the differently manured plots of the old and new permanent manurial experiments were also studied. The tentative conclusions that may be drawn from the two rounds of analyses are—

(1) The maximum activity was noticed in the N+K+P and cattle manure plots due to effects of manures. (2) There was no variation in the physiological groups due to effect of season. (3) The physiological groups were greater in the irrigated plots than in the rainfed plots. The activity was also greater in the irrigated plots. (4) The crop effects were not so well pronounced as the season.

(2) *Reduction of manurial bill for potatoes (the Agricultural Research Station, Nanjanad).*—The experiment was continued for the third year in succession. The year under report was more favourable than the previous year and the average highest yield of potatoes in the experimental plots was in the plots receiving Nanjanad mixture as control (10,500 lb.). The experiment revealed that with increasing dosage of phosphoric acid the yield of potatoes also increased, lime increased the yield when the level of nitrogen was low. The work was discontinued.

(3) Determination of nitrogen and phosphorous requirements of the soil types of the paddy areas in Tanjore district (Indian Council of Agricultural Research—Scheme)—

Research work under the auspices of Indian Council of Agricultural Research was commenced towards the end of September 1951 and fifty experiments were started in the ryots' fields with a basal dressing of 5,000 lb. of green manure and with variants such as ammonium sulphate and super-phosphate to give 30 lb. each of nitrogen and phosphoric acid.

The general percentage increases due to treatments were as below :—

					Ammonium sulphate plus 5,000 lb. green leaf.	Ammonium sulphate plus super-phosphate plus 5,000 lb. green leaf.
Grain	..	..	..	..	27	35
Straw	..	..	..	..	11	32

(4) *Foliar diagnosis of nutrient deficiencies of soil.*—The compound major elemental deficiency symptoms and plant characteristics were observed and plant analyses at different physiological stages were made. This study would give a clue to the true nutrition status of the soil. In the case of multiple deficiencies no reliance could be placed on visual symptoms and the true assessment could be made only by the chemical analysis of leaves at the flowering stage.

In the pot-culture studies, individual deficiencies of N and P were investigated and it was found that the decrease in yield due to different levels of deficiency of phosphorous was more steady than that of nitrogen. With decrease in nitrogen deficiency, the flowering duration was retarded while such phenomenon could not be observed in P deficiency series.

(5) *Compost experiments.*—Experiments with nightsoil compost and farm waste compost were conducted at a number of Agricultural Research Stations to compare their manurial values with farm-yard manure. The effect of these manures were also compared with no manure on different crops.

Nightsoil compost was tried in Rice Research Station, Tirurkuppam, Central Farm, Coimbatore and Lam Farm, Guntur. The experiments at Agricultural Research Stations, Anakapalle and Samalkota, were discontinued. Farm waste compost was tried in the Agricultural Research Stations, Pattambi, Aduthurai, Palur and Maruteru. In some of the stations composts gave as good a yield as cattle manure.

The effect of compost and farm-yard manure on the nutritive value of grains was examined and it was found that there was not much difference due to the treatments, though compost and farm-yard manure have given slightly better quality with regard to their protein content.

(6) *Loss of nitrogen from ammonium sulphate applied to black soils at Siruguppa in the cotton manurial experiment.*—This investigation was taken up to study whether the nitrogen applied in increasing dosage in the form of ammonium sulphate and groundnut cake to cotton in black soils benefits the crops or whether the nitrogen gets lost. It was found from the experiment that increased yields were obtained with increasing doses of ammonium sulphate and groundnut cake. Hence there is no room to fear that nitrogen will not benefit cotton under irrigation in these soils.

C. Soil biology—(1) *Micro-biological analysis of soils from the manurial experimental plots, Agricultural Research Station, Anakapalle.*—The object of the study is to find out the effect of continuous application of ammonium sulphate to sugarcane crop grown in rotation either with paddy or ragi on the micro-biological population of the soil when compared with that of the farm-yard manure. A preliminary analysis was completed and it was found

that bacterial population was higher in the manured series than in the no-manure series.

(2) *Biological and bio-chemical studies of pig and cow-dung treated cane-trash compost.*—In this connexion pig and cow-dung treated cane trash compost from Anakapalle were analysed to verify the reported superiority of pig-dung compost over the cow-dung compost. From the analysis it is not possible to find any special advantage for the pig-dung in bringing about a speedy decomposition of the raw cane-trash.

D. Green manures—(1) *Green manuring of paddy.*—The pot-culture and field trials now conducted to find out whether green manuring has any direct manurial value for paddy. The nitrogen balance in pot-culture experiment was worked out, which showed that there was gain of nitrogen in all the treatments excepting ammonium sulphate—uncropped series. This fact is in accordance with the results of the previous year except in the uncropped treatment which shows negative balance.

The yield data of grain and straw showed that green manure (Pillipesara 10,000 lb. per acre) gave the best results.

(2) *Comparative merits of the common green manure crops of the State*—

(a) The yield of green matter at different stages of growth was assessed in A and D blocks. The ratio of stem to leaf was also determined at different stages. The yield of daincha was highest in both the blocks at 60 and 75 days growth stage.

The yield of daincha and sunnhemp in D block was much higher than in A block. Owing to drought, the green matter yield at later stages was poor in all except daincha plot.

Paddy yields obtained by incorporation of green manures in D block experiment were highest in the Pillipesara series closely followed by the daincha series. Sunnhemp and cowpea lagged behind.

In A block too Pillipesara series gave the maximum yield of grain while daincha series gave the highest yield of straw.

(b) In both A and D blocks, daincha stood first in nitrogen fixing capacity.

(c) The physico-chemical studies of soils during the growth period of the paddy crop in A block showed two maxima and two minima in the pH values. The trend of results of D block experiment was in agreement with those of A block. The soils of plots treated with green manure have a higher amount of finer fractions than the 'no manure' plots.

(d) The total microbial population both in the surface and sub-soils of A block was high. In D block daincha and cowpea increased the bacterial activity of the surface soil, but the total population was higher in daincha, sunnhemp and cowpea plots. The micro-biological activity in A block soils was maximum in the surface soils of cowpea series and sunnhemp series was

the highest in the sub-soil. The organic carbon content of green manure plots was higher than the 'no manure' plots both in the surface and sub-soils. In both the blocks cowpea gave the highest values.

(3) *Experiment on the associated growth of cereals and legumes.*—The yield of ragi grown in association with different pulses in varying proportions, one-fourth to three-fourths, was statistically examined and economics worked out. Ragi gave the highest yields when grown with lab-lab in equal proportions and with redgram, one of pulse and three of cereal. Redgram series gave the maximum outturn than any other combination. The soil analysis showed that there is a decrease of soil nitrogen in the surface soil and increase in the sub-soil.

(4) *The saline tolerance of the common leguminous crops of the State.*—The saline tolerance of the common leguminous crops of the State was taken up and the toxic limit of common salt for daincha was tested in pot-culture experiments and it was found to be 0.25 per cent of sodium chloride. Pillipesara could not withstand even 0.1 per cent.

The number of legume cultures supplied to private individuals and departmental research stations was 594.

E. Agro-Industries—(a) *Improvement of cane jaggery by anti-oxidants.*—Studies on improving the colour and keeping quality of jaggery was continued. An anti-oxidant prepared from wheat flour did not confer any beneficial effect.

(b) *Preservation studies on ghee.*—It was found that among the samples prepared at different temperatures, the one prepared at 135°C had the longest storage life of 40 days when kept at a temperature of 37°C. Even high acid butter could be converted to give a ghee of fine aroma by heating to 144°C though its keeping quality would be rather short.

Experiments with the flavouring materials used domestically were tried. Curry leaf was found to impart good aroma and preserve the ghee for longer periods. Citric acid at 0.05 per cent resulted in good keeping quality but was only next to that of curry leaf in aroma.

(c) *Studies on fungal diastase.*—The effect of inetallicions of trace metals on the diastase production by the fungus was studied. The influence of metals on the saccharifying power of the enzyme was also assessed.

F. Miscellaneous.—The feeding trials with green manure plants such as *Sesbania speciosa* and *Glyricidia maculata* were tried with goatlings. The consumption of green leaves as well as the live weight of animals were recorded. Increase in live weight was 15 lb. in the case of *Glyricidia* leaves which was the maximum. No harmful effect was seen due to the feeding of these green leaves.

3. PLANT PHYSIOLOGY.

Pre-soaking seeds.—Studies were continued on the effect of pre-soaking seeds of different crop plants in phosphate solutions on their subsequent growth and yield. A new scheme was sanctioned during the year for investigating further the possibilities of pre-soaking seeds in nutrient salts as a method of improving crop yields.

Seed viability studies.—Studies with the chemical 2, 3, 5, TRI. phenyl Tetrazolium chloride indicated possibility of assessing viability of various seeds expeditiously without recourse to germination test. Even seeds with dormant periods could be assessed. The results were published in the *Madras Agricultural Journal* and a note for the guidance of the Seed Development staff was also prepared.

Water requirements of paddy varieties.—The result of pot-culture experiments indicated that ADT. 22 produced the maximum dry matter with the least transpiration ratio followed by MTU. 17 and ASD. 4.

Salt tolerance of paddy varieties.—Tellathokavadlu of Chittoor was found to be better than SR. 26 in salt tolerance. Experiments on the phasic assimilation of nitrogen and phosphoric acid and siliconphosphorous and nitrogen relationship in paddy varieties are in progress.

4. AGRICULTURAL ENTOMOLOGY.

Research—A. Investigations on crop pests.—Intensive research was pursued on the adaptability of a number of synthetic chemicals like BHC, DDT, HETP, Parathin, etc., against a number of crop pests. An interesting feature was the trial of the systematic insecticides. These chemicals when sprayed on plants are absorbed and retained by the plant tissues, which are on that account rendered highly toxic to a few groups of crop pests for fairly long periods. The other advantages are that the chemicals are not phytotoxic nor do they exert lethal action against the parasites and predators. Considerable work was also done on the adverse effects of BHC and DDT.

Pests of rice—(i) The rice stem borer (*Schoenobius incertellus*, W.).—Investigations on the influence of DDT and BHC sprays applied during the nursery and shot blade stages, immediately after the major emergence of the moths, were continued at the Agricultural Research Station, Aduthurai. The results show that the incidence is more severe on the 'Thaladai' crop. Among the several variants, BHC 0.1 per cent spray has given promise of control. The results are, however, not conclusive owing to the very low incidence of the pest.

(ii) The rice mealy bug (*Ripersia gryzae* Gr.).—The results of the spray given at the nursery and shot blade stages as a common measure against this mealy bug and the stem borer did

not exert any influence on the incidence of this bug, at the Agricultural Research Station, Aduthurai. Experiments to control this pest after the infestation manifests itself in the form of the sunken patches, were conducted. Of the various strengths of BHC, DDT, parathian, HETP, and the systemic chemicals used only in the higher concentrations like BHC 0.4 per cent, parathion 0.2 per cent and scharadan 0.75 per cent are promising and further trials are likely to yield fruitful results.

Confirmatory tests on the rice case worm (*Hymphula depunctalis* G) the white jassid (*Tettigoniella spectra* D) and the rice thrips (*Thrips oryzae* W) regarding the efficacy of the synthetic chemicals were made. An interesting case of the incidence of the aphid *Macrosiphum* sp. was noted on paddy.

(iii) Rats.—Investigation on the control of these rodents were continued at the Agricultural Research Station, Aduthurai. Attempts to improve the efficacy of zinc phosphide as a poison bait, by the addition of attractants like fried fish, onions, etc., against the most destructive species—*Bandicota bengalensis* G and K were not followed with any high degree of success, except for the broad indication that the addition of both these attracts a slightly larger number of the rodents. The comparative futility of baiting and the better efficacy of the local methods of digging and catching as well as bow trapping were established under the conditions prevalent in the Tanjore delta. Considerable fundamental information regarding the habits, nature and extent of damage, field population and of the factors which render the use of poison baits ineffective against this species, was gathered. Based on the data collected so far, further lines of research, to fill up some of the gaps in our knowledge as well as on the trials of newer rodenticides, have been chalked out.

Pests of millets—The sorghum fly (*Atherigona indica* M.).—The comparative merits of different methods of control like adopting a higher seed rate and the subsequent thinning the infested plants, the influence of different manures on the incidence of the fly, flooding and periodical applications of BHC and DDT, were studied at the Agricultural Research Station, Siruguppa. While the last mentioned method gave some indications of control, the method of using a thicker seed rate was found to give higher yields.

Pests of fruits—(i) The fruit sucking moth (*Otheris* sp.).—Exploratory trials with BHC 0.05 and DDT 0.1 per cent sprays showed a fruit fall of 2 per cent and 3.5 per cent respectively as against 10 per cent under the controls. Though the results of BHC are encouraging, the use of this chemical cannot be advocated, as it taints the flavour of the fruits.

(ii) The orange thrips (*Thrips* sp.).—The peculiar scarring of the rind as a result of the damage by a species of thrips was reported from Chattrapatti. Insecticidal trials could not be pursued to conclusive ends, as the incidence of the pest was very low.

Confirmatory tests on the high efficacy of DDT and HETP sprays against the mangohopper (*Idiocerus* sp.) and of BHC spray against the castor slug (*Parasa Lepida* G) and the red tree ant (*Oeophylla smaragdina* Fb) were conducted. Against the San jose scale (*Quadraspidotus perniciosus* C), the approved method is the application of diesel oil emulsion sprays. Mixed dormant washes of sandolin A and Euphytan Winter were also found equally effective. An instance of the castor capsule borer (*Dichocrocis punctiferalis* G) boring into jack fruits and another case of its feeding on the inflorescence of the Avacado pear were recorded for the first time.

Pests of oil seeds—(i) *The black-headed caterpillar* (*Nephantis serinopa* M).—Besides the usual biological measures followed for the control of these caterpillars with the help of their specific parasites tests with BHC sprays were repeated. The insecticides were found highly effective and its application may be quite possible in the case of young trees, the foliage of which could be easily reached.

(ii) *The Rhinoceros beetle* (*Oryctes rhinoceros* L).—Results, full of interesting possibilities, were achieved on the control of this serious pest in its breeding ground. Laboratory trials with BHC 0.2 per cent spray and parathian 0.025 per cent and BHC dust 10 per cent applied on the top surface of the manure, caused a complete extermination of the grubs below, in the course of three weeks. The experiments are being continued.

The high efficacy of the synthetic chemicals against the castor capsule borer—*Dichocrocis punctiferalis* C.). The castor jassid—*Empoasca* sp.—and the groundnut "surul poochi" *stomopteryx nerteria* M—was established by further experiments.

Pests of cotton—(i) *The cotton jassid* (*Empoasca devastans* D).—Experiments with Kilex, HETP, Kothane, etc., show that all the three are as effective as DDT against this leaf hopper.

(ii) *The cotton boll worms* (*Earias* sp. and *Platyedra* sp.).—A number of insecticides, most of them consisting of different concentrations, formulations and mixtures of DDT, BHC and sulphur were applied at periodical intervals in properly laid out experimental plots at the Agricultural Research Stations, Siruguppa and Aduthurai. The indications were that the mixtures of BHC, DDT and sulphur and BHC 0.1 per cent spray are more effective. The experiments are still in progress.

Insecticidal trials—(Synthetic insecticides).—A number of synthetic insecticides like BHC, DDT, Benxide, Rothane, Hortex, etc., were tried against a variety of crop pests like the bhendi jassid, the cabbage bug, the ragi leaf noctuid, cutworms, fly maggots, etc., and the relative merits of the chemicals recorded. The results obtained are likely to be useful for the furtherance of the experiments on a field scale. The indigenous vegetable insecticide—*Theviotia nerifolia* juss was found effective against hairy

caterpillars like *Euproctis* sp., *Eupterote* sp. and aphids. But the experiments could not be continued as these could not stand comparison either in their efficacy or in cost with newer synthetic formulations.

Systemic insecticides.—These new preparations were tested primarily against aphids and mites, besides a few other categories. The special feature about these insecticides is that they can be used as sprays as well as applied to the soil along with irrigation water. The plants readily absorb the poisonous element, by virtue of which sap feeders like aphids and mites are easily killed. The additional advantages are that the plant is rendered immune against these pests for periods up to a month and that the lethal action is restricted only against the pests concerned and not against the parasites.

Exhaustive trials against the Lab Lab aphid—*Aphis medicagenis* K—and the cowpea aphid—*Aphis* sp.—and mites on brinjal and castor—*Tetranychus* sp.—have confirmed the high lethal properties of the insecticides. Certain preparations like pestox, Isopestox, etc., have also been fairly effective against the Coccid—*Pseudococcus Virgatus* Ok1—the cotton jassid—*Empoasca devastans* D—*Phyllids* on curry leaf, and the lab-lab bug—*Cotosoma cribraria* F. The advent of these chemicals has practically revolutionised the existing methods of pest control and the synthesis of newer formulations potent enough to control other categories of crop pests would constitute a definite advancement in Economic Entomology.

Coccides.—A number of species like—*Pseudococcus Virgatus* CK1—on gliricidia, *Pseudococcus corymbatus*—var—*Pilametnosus* var—on cotton—*Lecanium* sp.—on coffee and guava, etc., were experimented with a number of insecticides like DDT, BHC, HETP, parathian, etc., of the numerous variants, parathion spray at 0.025 per cent appears to be a specific against this family of troublesome insects. But the preparation is highly poisonous and as such should not be touched by hand. It is also likely to be absorbed and retained by the plants, which is again attendant with some risks to man and other animals consuming the produce.

Aphids.—Adequate attention was paid towards the control of this group of crops pests, with the main idea of finding out a synthetic substitute for tobacco, which has been the time-honoured, specific and which is, of late, getting difficult to procure. Apart from the systemic insecticides already discussed a weak concentration of HETP at 0.05 per cent was found to be highly efficient. Special mention has also to be made about the convincing results obtained by the application of BHC 5 per cent dust against the ragi root aphid—*Tetraneura hirsuta* B. This is one of the pests the control of which has, so far, been elusive. Some work was also done on the potentialities of the predators on aphids.

Laboratory trials.—Interesting work on the comparative toxicity of the different commercial synthetic preparations on the eggs, larvae and pupae of a few Lepidopterous insects was in progress.

Insecticidal and adverse effects of DDT and BHC.—Detailed investigations were conducted on these aspects. DDT and BHC dusts at 5 per cent and sprays at 0.1 and 0.05 per cent were applied on a few vegetable crops like bendi, brinjal, onion, amaranthus and radish. The chemicals were applied once, twice and thrice and results noted for their insecticidal action, phytotoxic effects, secondary infestation and tainting of the produce. The pests concerned were the jassid—(*Empoasca*) on brinjal and bendi, the mite (*Tetranychus* sp.) on castor and the *Epilachna* beetle on brinjals. DDT was found to exert a high lethal action against the jassid as well as *Epilachna* sp. with confirmed residual effects, extending for a period of two or three weeks, while BHC was not effective. But the application of the former was followed by a severe infestation of mites in the case of brinjal. This can be directly attributed to the complete inertness of the chemical against the mite and the high lethal action against the parasites and predators. A certain amount of stimulant action also was noted in the case of DDT. The phytotoxic reaction of BHC was obvious on brinjal and amaranthus. The more serious disadvantage is by tainting the edible parts of all these vegetables. All of them, except onions, did not exhibit the smell when raw, but were definitely unpalatable when cooked. The smell was strong in the case of onions even when raw and was not deodorised even when the bulbs were mixed with charcoal and kept for about four months. DDT, though it did not impart any undesirable flavour, neutralised the natural flavour in all these cases. The findings go to show that the use of these chemicals should be avoided on most vegetables.

Viability of seeds.—DDT and BHC dusts at 5 per cent when mixed with seeds at the rate of 1 lb. to 100 lb. were found to confer a remarkable degree of immunity against a variety of pests up to a period of one year. In the eleven different seed materials experimented with, their viability was not in any way affected up to the period of one year. Some interesting information on the relative susceptibility, as well as the time taken for mortality for the different species of insects was also recorded. A more interesting aspect is the absorption of these chemicals by seeds having a high oil content. Cotton seeds mixed with these chemicals and stored for about four months had absorbed and retained 99.73 parts of DDT and 21.9 parts of BHC per million. Equally interesting results were obtained in the case of groundnut and cotton seeds fumigated with calcium cyanide. The treated samples contained poison from 5.7 to 41 parts per million. On account of the possible hazards to human beings and cattle consuming these seeds, the use of any of these chemicals has been prohibited on the stocks held by the department.

B. Biological control—(i) *The apple woolly aphis* (*Eriosoma lenigera* H.).—An assiduous colonization of the specific parasite—*Aphelinus mali* H., has successfully kept this aphid under control at the Pomological Station, Coonoor. The parasites appear to have established themselves fairly well in the locality. No further artificial fillip was, therefore, found necessary during the year under report.

(ii) *The coconut caterpillar* (*Nephantis Serinopa* M.).—The incidence of this caterpillar was successfully maintained within bounds by the mass multiplication and liberation of the specific parasites, namely, the Bethyloid—*Peristerola nephantidis* M.—the Braconid—*Bracon serinopae* W and the Eulophid—*Trichospilus pupivora* F.

(iii) *The cotton boll worms* (*Earias* sp. and *Plattadra* sp.).—Weekly releases of 20,000 parasites, per acre were made in a two-acre field at the Central Farm, with another field as control. Parallel examinations were conducted, first on the buds and bolls and later, on the kapas for noting the progressive infestation. It was found to commence with a modest beginning of 2.1 per cent and increase up to 58.4 per cent in the controls, while it ranged between 1.6 per cent and 15 per cent in the colonised plots.

(iv) *The cholam stem borer* (*Chilo zonellus*).—Similar experiments were conducted against this pest also in four-acre blocks. The results were not conclusive, owing to the low incidence of the pest, since the percentage of infestation did not exceed 3.7 in either the control or the colonised plots.

(v) *The castor semilooper* (*Achoea janata*, L.).—Unlike for the previous insects, the liberations were confined in this case to a few days immediately following each shower during north-east monsoon. The reason for this modification is that the moths emerge in large numbers only after some heavy rains during December, and that the host material for the parasites would be available only during that period. The results of the release were assessed. An appreciable difference was perceptible both in the percentage of parasitism as well as the larval population between the colonised and control plots. The results, though indicative, cannot be claimed to be conclusive, since adequate facilities necessary for the proper conduct of experiments of this sort were not available. The work was closed during the year.

Sugarcane scheme.—Research on the items chalked out already were in progress. The main lines of observations are the influence of the weather, climatic and micro-climatic factors on the borer populations, mortality and compensation indices studies, alternative hosts and parasites and predators. The work, being a mere continuance of the programme, no information of any special interest was available, except that the results were in general agreement with those of the previous year.

Rodolia Breeding Scheme.—The incidence of the cottony cushion scale—*Icerya purchasi*, mask—on the Nilgiris and Kodaikanals was effectively kept under check by the assiduous colonisation of the predator—*Rodolia cardinalis* Muls. The two plant Quarantine Stations at Mettupalayam and Shemabaganur were functioning satisfactorily by intercepting the transport of all the notified host plants of *Icerya purchasi*, Mask and thus preventing its inadvertant spread to newer localities.

The orange borer.—The borer was identified as *Chelidonium argentatum* Dalman. Confirmatory tests regarding the inefficacy of the insecticidal washes and infallibility of clipping the wilted twigs along with the young borers and syringing petrol against the grown-up borers in the stem were conducted. With the evolution of these methods, the problem which was serious till now was considered to have been once for all solved and the scheme was eventually closed.

C. Bee-keeping.—The outstanding lines of research under this head in the section are (i) selective breeding, (ii) artificial pollen substitutes, (iii) bee pasturage and (iv) propaganda. Under the first item, a colony was selected for its desirable traits by about 1940. The performance of the same was found to be consistantly better than the others all these years. Under pollen substitutes, the response of the bees to mixtures of soyabean, yeast and groundnut, sweetened either with jaggery or sugar was studied. The bees did relish the substitutes but the quantity of the daily intake was so meagre that it exerted little or no influence on the progress of the colonies. A few minor sources of pollen and nectar were recorded. Special mention has to be made about the remarkable popularity of our comb foundation sheets; over 170 lb. of the sheets were supplied to the Village Industries Committee, Poona, and 50 lb. to the departmental officers for use within the state.

Bee-Keeping Scheme (Indian Council of Agricultural Research).—The items of work regarding selective breeding and pollen substitutes discussed above were continued as work under the scheme. Newer lines of research initiated are the influence of the weather factors on the secretion and concentration of nectar, estimation of the quantities of pollen collected by the bees per trip and the chemical analysis of honey from different sources. The schemes commenced only in December and the revised technical programme submitted is being followed.

Miscellaneous—Fumigations.—Over 1,000 bags of grains and 34 smaller consignments from the various specialists were fumigated and phyto-sanitary certificates issued, whenever necessary. About 500 bags of dumnuts were also treated with HCN and rendered free of the Scolytid beetle *Cocotrypes dactyliperda* F. Assistant Entomologists working under the Civil Supplies department attended to the proper storage of foodgrains free from insect pests and rodents.

5. AGRICULTURAL MYCOLOGY.

Research—Investigations of diseases of food crops—(i) Disease of rice—(a) Blast—*Piricularia oryzae* **Varietal resistance trials.**—Field trials were laid out on the same lines as in previous years at Coimbatore, Agricultural Research Station, Aduthurai and Agricultural Research Station, Buchireddipalayam. At Buchireddipalayam the early sown crop escaped infection and the later sown crop could not be maintained till harvest owing to the failure of water-supply. At Coimbatore and Aduthurai the disease occurred in a severe form. Three cultures Nos. 1560, 6538 and TKM 1 were highly resistant; the last one is of short duration.

Effect of varying doses of nitrogen on the incidence of blast.—Field experiments were conducted with three resistant and one susceptible variety. Three levels of nitrogen, viz., 40, 80 and 120 pounds per acre were applied over a basal dressing of 5,000 lb. green leaves. The nitrogenous manure was applied in two forms, viz., groundnut cake and ammonium sulphate. The disease was influenced by increased doses of nitrogen either in the organic or inorganic form in the susceptible variety but not in the resistant variety.

Effect of potash and phosphorus on the incidence of blast.—Varying levels of potassium sulphate and super phosphate were added over a basal dressing of 120 lb. nitrogen per acre. The incidence of the disease was high in all the plots and no amelioration was evident due to addition of potash or phosphorus.

Factors determining resistance to blast.—In previous studies the correlation between the silica content of the epidermis and the resistance to blast was established. The relations between the number of stomata per unit area of the leaf and the reaction of the cultures was determined this year. There is an indication of negative correlation between disease resistance and the number of stomata.

Study of different isolates of Piricularia.—Six isolates obtained from different hosts were under study. Of these isolates the one from *Panicum repens* was found to pass on to all other hosts, except one. The isolate from *Bracharia mutica* infected rice and also its own host. The others were pathogenic on their own hosts only. The viability of the spores of *Piricularia* on pieces of straw stored in different ways was found to extend to two months only.

Use of fungicides for the control of the disease in the nursery.—The comparative efficacy of three fungicides, viz., Dithane Z.78, Bordeaux mixture and Perenox was tested for the control of the nursery phase of blast. Two susceptible varieties were grown. It was found that under conditions favouring infection, these fungicides did not give sufficient protection.

(b) *Foot rot*—*Fusarium moniliforme*—*Varietal resistance trials*.—Twenty-two cultures of rice were tested to assess their relative resistance to foot rot. It was found that all of them were susceptible.

Fungicidal trials.—Fifteen fungicides were used for seed treatment to compare their relative efficacy in controlling foot rot. Six of them were efficacious.

(c) *Stem rot*—*Sclerotium oryzae*.—Pathogenicity trials were conducted with pure cultures of the fungus isolated from different places. Positive infection was obtained only in some cases and not in all trials.

(ii) *Sorghum diseases*—*Sorghum rust* *Puccinia purpurea*.—Forty-five cultures of sorghum grown at the Millet Breeding Station, Coimbatore, were examined in detail and found to exhibit low infection in the field and also when artificially infected. The viability of the urediospores present in the straw was found to be lost in a month. Variation was noticed in the germination of urediospores produced in different months, the lowest being in May and June.

Grain smut (*Sphacelotheca sorghi*).—The efficacy of four different fungicides for the control of grain smut was compared. All the fungicides were found effective. But the treatments did not confer any protection against head smut or downy mildew.

Long smut (*Tolyposporium ehrengergii*).—This smut is prevalent in the crop sown in December–January in the districts of Madurai, Ramanathapuram and Tirunelveli. The variety of sorghum called 'Vellai' is highly susceptible, while 'Irungu' is rarely infected. The culture A.S.8310 which is a cross between vellai and irungu was found to be susceptible under artificial infection.

(iii) *Cumbu—Rust* (*Puccinia penniseti*).—All the cultures grown at the millet breeding station were found to exhibit high infection. Seven cultures which had low infection in previous years were severely affected this year. Artificial inoculations were continued on the *P. typhoides* × *P. Purpureum* hybrids. One hybrid allotetraphoid IV × cumbu was not infected.

Cumbu—Green ear (*Sclerospora graminicola*).—Seed treatment with four fungicides was carried out to see if the treatment has any effect on the incidence of green ear disease. Diseased plants were present both in the treated and control plots though the incidence was very low.

(iv) *Ragi blast* (*Piricularia* sp.).—The incidence of blast in the promising cultures of ragi grown at the millet breeding station was compared. The incidence was low in all the cultures in spite of spray inoculation with the spores of the pathogen. Artificial infection of eight cultures under pot-culture house conditions however showed that all of them were susceptible. Further tests are in progress.

(v) *Setaria italica—Smut*—*Ustilago crameri*.—The efficacy of the organomercury compound as a dressing material on the control of smut and downy mildew was tested. The smut was completely controlled. But the incidence of downy mildew though low was the same in the treated and control plots.

Setaria italica—Rust—*Uromyces Setariae italicae*.—The cultures of tenali grown at the millet-breeding station numbering about 210 in all were periodically examined to observe the intensity of infection in each. No culture was free. The rust occurring on koralai (*S. glauca*) though belonging to the same specie does not pass on to tenai nor *vice versa*.

(vi) *Wheat—Black rust*—(*Puccinia graminis*).—Four grasses were found to be infected by *Puccinia graminis* on the Nilgiris. All the four were affected by *P. graminis avenae* while two were infected by *P. graminis tritici* also. This variety of rust passed on to wheat.

On the Nilgiris, four Australian rust resistant varieties were grown in ryots' lands in two seasons. Two varieties were found to be very good and gave high yield and there was great demand for the seeds of these varieties.

2. *Investigation of diseases of commercial crops*—(i) *Cotton—Black arm*—(*Xanthomonas malvacearum*).—Thirty-six selected cultures were tested for their relative resistance to black arm. The cultures were subjected to repeated artificial infection. Five cultures exhibited high degree of resistance. The culture 2196 continued to show high resistance. Two new selections M.U. 9-49 and Co. 3-29-50 were found to be highly susceptible when tested under laboratory conditions.

(ii) *Ginger—Rhizome rot* (*Pythium* spp. and *Sclerotium rolfsii*).—A scheme for the investigation of various aspects of the cultivation of this crop is in progress for the last two years at the Agricultural Research Station, Pattambi, under the control of the Paddy Specialist. The study of diseases of this crop is done by the Mycologist. The treatment of the rhizomes with different fungicides before storage was repeated as in the previous year. Ceresan (0.25 per cent) treatment gave the highest germination and yield.

Field experiments were repeated to test the efficacy of soil treatment with different fungicides before planting on the incidence of rhizome rot and wilt in the field. This year also it was found that 0.1 per cent mercuric chloride and Bordeaux mixture adversely affected the germination which was reflected in lower yields. Cheshnut compound and colloidal copper gave the best results.

Leaf blight (*Pellicularia filamentosa*).—A disease of ginger resulting in blighting of leaves was prevalent during the rainy season in Malabar. The organism was studied in detail and its parasitism established. Preventive spraying with 1 per cent bordeaux mixture checked the spread of the disease.

(iii) *Turmeric rhizome rot* (*Pythium graminicolum*).—The disease was prevalent in Tiruchirappalli. The pathogen was isolated, identified and parasitism established.

3. *Investigations of diseases of fruits and vegetables*—(i) *Oranges*.—The sweet orange in Rajampet and Kodur was found to be deteriorating. An inspection of the area revealed the prevalence of deficiency diseases, pink disease, *Diplodia gummosis* and die back. Lack of sufficient supply of water for irrigation was responsible for the withering of a number of trees. It was decided to intensify propaganda and demonstration of the methods of controlling these diseases in selected gardens. Spray application of deficient elements and prophylactic treatment to prevent *Diplodia* infection were carried out. In some gardens distinct improvement was seen in the course of three months. But in others no difference could be made out between the sprayed and unsprayed gardens as acute shortage of water adversely affected all trees in the summer. Absence of *Diplodia gummosis* was evident in the treated trees.

(ii) *Vegetable diseases*.—(a) Wilt of brinjal and chillies rootrots of cluster beans, bendai, brinjal, cowpea and mosaic of bendai were studied.

4. *Ergot production*.—During the year a farm for ergot production was opened on the Nilgiris near Ootacamund. A block of 41.5 acre has been taken over from the Forest Department on 31st March 1952. This was ploughed and 30 acres have been sown to rye. Arrangements are in progress for raising live hedge round the farm.

During the year 1951 the area sown to rye amounted to about 52 acres under black winter rye and about 23 acres under Italian rye. The latter was disappointing as it was a bushy spreading variety and produced few tillers. The weather was not congenial for ergot production and there was some damage caused by *Helminthosporium* on rye. The total quantity of ergot produced amounted to about 128 pounds.

In 1952, about 50 acres in all have been sown to rye in the first season.

Assays of individual ergots were made and new heavily sporulating isolates have been obtained from sclerotia having alkaloid content of over 0.5 per cent. These will be used for spray inoculation in the coming season.

5. *Systematic Mycology*.—New collections of fungi from different parts of the State were examined and identified. Several new species were present. These were fully described and sent up for publication.

6. *Quarantine, legislation and advisory work*.—Consignments of seeds and plant materials intended for export were examined and phytosanitary certificates issued when they were found to be free from diseases.

6. AGRICULTURAL METEOROLOGY.

The main lines of research pursued in this section.—(1) Collection daily meteorological data both in the open and in crop fields, at 07.00 and 14.00 hours is being done regularly.

(2) The crop weather experiments have been started at six agricultural research stations and are in progress for the fourth year in succession. The crops that are under this experiment are detailed below :—

(a) Coimbatore	.. ..	Paddy cotton and cholam.
(b) Aduthurai	.. ..	Paddy.
(c) Pattambi	.. ..	Do.
(d) Hagari	.. ..	Cotton and cholam.
(e) Samalkot	.. ..	Paddy and sugarcane.
(f) Koilpatti	.. ..	Cotton and cumbu.

Precision observations are recorded on the abovementioned crops as per the technical programme drawn up by the Director, Agricultural Meteorology, Poona, on an All-India basis.

A careful record of the outbreak of pests and diseases is being maintained in addition to exhaustive data on weather conditions, in order to study the influence of weather conditions on the activities of the pests and diseases.

(3) *Statistical analysis*.—(a) Sunshine data collected at Agricultural College and Research Institute and Cotton Breeding Station for a period of 20 years were analysed statistically and a paper was submitted to the Indian Journal of Meteorology and Geophysics for publication.

(b) Wind velocity data collected at Agricultural College and Research Institute at 40 feet height for a period of 38 years were analysed and the analysis was further pursued with the precipitation data for the corresponding period.

(c) The 'Confidence limits' of expected monthly rainfall at Agricultural College and Research Institute were worked out and a paper was written on the findings.

(d) The statistical analysis of the rainfall data collected at the Agricultural College and Research Institute, Coimbatore, with reference to the relative influence of the meteorological factors like maximum and minimum temperatures, wind velocity and relative humidity was completed and a short note on the conclusions drawn was published in the Madras Agricultural Journal (December 1951).

(e) Rainfall data collected for 82 years in the districts of West Godavari, Krishna, Guntur, Nellore, Chingleput, North Arcot, South Arcot and Chittoor were analysed.

(f) The rainfall data of 82 years for all the districts were studied monsoonwise and a rainfall chart covering the Madras State was prepared.

(g) The data collected from the petri-dish evaporimeter were compiled and studied to find out the evaporation precipitation ratio.

(h) The growth data of paddy Co. 16 collected during 1948-49 and 1949-50 were studied.

(i) The yield of GEB. 24 (paddy) for a period of 35 years was statistically studied for its relative dependence on the meteorological factors.

(j) The influence of rainfall and temperature on the irrigated Cambodia cotton at Coimbatore was statistically studied.

(k) The micro-climatic dry bulb temperature was correlated with the growth of cholam during the years 1948-49 and 1949-50.

(l) The growth rates of cotton K.2 and K.5 varieties during 1950-51 were compiled and a polynomial growth curve for K.2 was fitted up.

(m) Micro-climatic data collected in cotton in 1948-49 and 1949-50 were analysed.

(n) The available data on five important major crops of the Ceded districts for 49 years were compiled and graphs and tables were prepared.

(o) The data collected at Hagari, Anakapalle, Tindivanam, Koilpatti and Guntur for ten years on the rainfall yield correlation experiments were analysed.

(p) The data collected on drought resistance trials at Paddy Breeding Station were also analysed.

(q) The soil moisture data collected from 1948-51 at the observatory and the cropped fields were compiled for analysis.

(r) In collaboration with the Government Entomologist, micro-climatic data at different heights were recorded on brinjal, bendai, groundnut, cotton and paddy crops when pests occurred on them. Soil moisture estimations were also done at different depths whenever necessary.

The collection of data on crops and weather has to be done systematically for a considerable period, at least two decades, for analysis and interpretation of the results and foresee the possibilities of prediction of crop prospects and outbreak of pests and diseases.

7. CROPS IMPROVEMENT WORK.

(a) Paddy.

Paddy improvement work was carried on at the Paddy Breeding Station, Coimbatore, and in the Agricultural Research Stations at Aduthurai, Ambasamudram, Anakapalle, Buchireddipalayam, Mangalore, Maruteru, Palur, Pattambi, Pulla, Samalkota and Tirurkuppam. These stations are fairly representative of the major paddy growing areas of the State. The yield per acre normal yield and seeds distributed from each station are shown in Appendix III.

Though the season was normal for paddy in the Circars, it was adverse for the fifth year in succession in the southern districts and the second crop in the West Coast. In Krishna and Guntur, the crop suffered from stem borer attack while about 50,000 acres were affected by flood in West Godavari district. The Thaladi crop in Tanjore was below normal due to late planting. In the districts of North Arcot, Chittoor, Chingleput and South Arcot the crop suffered for want of rains and inadequate water-supply in the wells.

Strains released for distribution.—The following strains found promising in districts trials will be released for distribution and these will serve about a lakh of acres of paddy area :—

Co. 27 Bangaruteegal.	Adt. 24 Poon samba.
Co. 28 Pudupatti samba.	ASD. 10 Kolavazhai.
Wynaad 1 Palthondi.	TKM. 5 Manakattai.
Wynaad 2 Marathondi.	

District trials.—In Malabar cultures in Chonali and Arikirai varieties were under district trials.

In Chingleput district, kapakar trials failed due to the failure of monsoon but in sornavari season two high yielding cultures were under trial.

In South Kanara, two cultures in each of Kayama, Kanwa, Mascathi and Athikraya varieties were under trials. Except Mascathi cultures, others did better than local.

In Krishna district, Peddakusuma culture 4688 gave 76 per cent increase over local.

Selection work.—Selection work was continued in all the research stations at Coimbatore, work on Barigavadlu of Anantapur was continued. At Pattambi, 12 promising cultures were carried forward being promising. At Tirurkuppam high yielding Swarnavari cultures better than TKM. 3 released for cultivation, were found. At Mangalore, 19 cultures were found promising. At Ambasamudram, 206 selections in Pulidipiratti (a dry rice), Sembuli and Maikuruvai were found better than controls. At Buchireddipalem, in spite of adverse seasons some cultures in Pishanam, Samnavadlu, Masipishanam (rice usually drilled) and Iswarakora recorded higher yield. At Aduthurai, selection work in short duration red rice variety Mattakuruvai and three sandy coastal varieties was progressing.

Hybridization—(a) *Evolution of blast resistant strains.*—Co. 25 a blast resistant Sirumani continues to be popular in Tanjore and is finding favour in Madurai and Tirunelveli districts. Hybridization for improving the quality of Co. 25 and for evolution of short and medium duration strains was in progress and the season being favourable for blast, helped the work.

(b) *Drought resistant strains*.—Some hybrid cultures between wild and cultivated rices were found to be high yielding with superior quality and drought resistance.

(c) Evolution on saline resistant strains by crossing varieties as S.R. 26-B and Tellathoka-vadlu known to be saline resistant with popular strains was carried on at Coimbatore. It is necessary to pursue the work on typical saline areas. A research station should be opened specially for this purpose.

(d) Evolution of dormant short duration strains and crosses between paddy races *Indica* and *Japonica* were in progress. Hybridization work was in progress at the several Agricultural Research Stations also in collaboration with the Paddy Breeding Station, Coimbatore.

Deep water rices.—The work of evolution of suitable strains for submergible areas covering about 2 lakhs of acres in the State, was in progress at the newly opened rice research station at Pulla in West Godavari district. The first year's trials indicated that a Siamese type gave 1,150 lb. while other local varieties perished completely in the submerged areas.

Induction of mutations.—A few promising mutants with higher yielding capacity were obtained by treating germinating seeds with chemicals such as caesan, acenaphthene and benzene.

Type collections.—One hundred more pure lines were added during the year bringing the total type collections to 2,400 some Chinese types were planted in the first crop season in a co-ordinated set of trials with the Central Rice Research Institute, Cuttack.

Manurial trials.—Night-soil compost was found to be better than cattle manure for the samba paddy while it was equal in effect for the swarnavari in Tirurkuppam. Composts and cattle manure were better than "no manure" at Tirurkuppam and Maruteru. Fused phosphate was found to be better than superphosphate. Super applied to green manure crops increased their yields up to 50 per cent in the West Coast and Aduthurai and the indications are indirect application of phosphate through green manure is more efficacious than direct application. Varying the dose of phosphate with different doses of nitrogen did not produce differential effect. By planting sesbania seedlings closely with paddy along the margins of field bund green leaf up to 5,000 lb. could be secured under normal conditions.

Other crops grown in rotation with paddy.—It has been demonstrated that whenever irrigation facilities could be had, short duration cottons and groundnuts could be profitably grown in the rice fallows. MUI cotton grown mixed with dry paddy in lines 8 feet apart was found paying at Tirurkuppam.

Seed distribution.—A total quantity of 786,350 lb. or about 350 tons of improved seeds were distributed from the Agricultural

Research Stations of the State. These will be sufficient to raise 14,000 acres of primary seed farms. Besides 200 tons of seeds of strains of MTU 19, Co. 19 and Co. 25 were got from the Godavari and Tanjore delta for supply to the districts of North and South Arcot, Chingleput and Chittoor.

(b) Millets.

Millets improvement work was carried out at Millets Breeding Station at Coimbatore and at the 10 other regional centres: Ariyalur (Tiruchirappalli district), Lam (Guntur), Hagari (Bellary), Ongole (Guntur district), Koilpatti (Tirunelveli district), Narasapatnam (Visakhapatnam district), Nandyal (Kurnool district), Tiruppathur (North Arcot district), Siruguppa (Bellary district). Main work was on the major millets, namely, cholam, cumbu, ragi and tenai in all centres while the minor millets were studied at Coimbatore and three other centres.

Cholam.

Rainfed.—The main season crop of cholam at the Millet Breeding Station was practically a total failure due to severe drought that prevailed during the early stages of crop growth. In *Periamanjai cholam*, three selections—A.S. 8001, A.S. 8002 and A.S. 8112—which recorded high yields in the previous three seasons await conclusive tests. A.S. 8001 was significantly superior to local *Manjamakkattai cholam* at Ariyalur, while all the three were superior to the local types at Tirupattur. The *Talaivirichan cholam* type A.S. 8008 was superior to the existing strains Co. 2 and Co. 3 both at Coimbatore and the Regional Millet Stations. The straw of high yielding and juicy selection A.S. 7657, of *Talaivirichan cholam*, was found to be superior to that of Co. 2 and Co. 3. The bold grained types of *Talaivirichan cholam*, isolated from crosses, also await final yield tests. A.S. 475, a selection of *Talaivirichan cholam* gave 11 per cent more grain than the local at Narasapatnam, while five high yielding selections from Coimbatore out yielded the local type at Tirupattur. A.S. 7081, extracted from a cross between *Irungu* and *Periamanjai cholam*, gave 20 per cent more yield than *Kaka Irungu* at Ariyalur. The same selection recorded an increased yield of 17 per cent grain and 4 per cent straw over the *Irungu* strain K.1 at the Agricultural Research Station, Koilpatti and an average of 66 per cent more grain and 26 per cent more straw yields over the local varieties in district trials. At Ariyalur, the *Vellaimakkattai* selection A.S. 7537, isolated at Coimbatore gave 15 per cent and 25 per cent more yields of grain than the local *Vellaimakkattai* and *Manjamakkattai* types respectively. *Patcha Jonna* is an important rainfed variety, grown in the Circars, and the Ceded districts. In this variety, three *Mungari Jonna* selections of Nandyal—N.J. 6, N.J. 16 and N.J. 20—were released with station numbers N. 10, N. 11 and No. 12 respectively. They are found suitable for distribution in Dhone and Pattikonda taluks of the Kurnool district. The evolution

of high yielding selections from the local samples of *Patcha Jonna* was in progress at Ongole and Narasapatnam. At Hagari, in yield trials with *Tella Jonna* types (rainfed variety having white grain grown in Bellary and parts of Anantapur district) along with the standard strains H. 1 and M. 47-3, two selections J. 762 and J. 718 registered the highest grain yield. The Tenkasi cholam selections sent from Coimbatore were found to be suitable to the early (*Mungari*) season at Siruguppa.

Irrigated cholams.—Thirteen strains of irrigated cholam representing different varieties grown in the southern districts of the State have already been released from the Millet Breeding Station, Coimbatore. They are Co. 4 to Co. 16. In addition to these, promising selections of *Sen cholam*, *Chinnamanjal cholam* and *Vellai cholam* combining in them high yield and good quality of straw have been isolated and are in various stages of trial. In trials conducted with selections having juicy stem in *Sen cholam* and *Chinnamanjal cholam*, four selections of the former and three of the latter were significantly superior to their respective standards Co. 4 and Co. 5 in straw yields. The increase in yields ranged from 66 to 85 per cent in the case of *Sen cholam* and 49 per cent to 54 per cent in the case of *Chinnamanjal cholam*. The difference in grain yields in both the cases were however not significant. At Siruguppa, the cholam strains Co. 7 and Co. 8 and Co. 12 were found to be highly resistant to the cholam fly. In district trials the two irrigated *Vellai cholam* selections A.S. 8155 and A.S. 8159 (the latter having juicy stalks) gave 20 per cent more grain yield than the local type at Sattur and 15 per cent more yield at Srivilliputhur, Mudukulathur and Aruppukkottai.

Striga Research Scheme.—Striga is a serious root parasite on Sorghum and it causes severe losses in yield in certain seasons. Experiments for the control of this parasite by the evolution of resistant varieties and by agronomic methods were in progress at four centres—Coimbatore, Nandyal, Hagari and Guntur—under a special research scheme, partly financed by the Indian Council of Agricultural Research. The progenies of crosses between representative types of the various centres and A.S. 4003, *Bongan hilo*, a resistant type from Africa, are under various stages of trial. Nine selections of *Periamanjal cholam*, from the progenies of (Co. 1 × A.S. 4003) × Co. 1 were on a par with A.S. 4003 with regard to striga resistance in 1951 season. All of them gave significantly higher yield of grain. As a result of taking one trap crop, significant reduction in striga infection was noticed both at Nandyal and Coimbatore. Hand weeding and spraying with Fernoxone and Agroxone did not improve the yield of the crop, due to the fact that much of the damage to the crop is done when the parasite is still underground, as totally parasite on the host, whereas these control operations can be done only after the parasite appears above the ground. As a result of deep cultivation in the summer season, which exposes the seeds of striga in the soil to the

sun, there was a significant reduction in striga incidence at Nandyal, where the temperatures were higher than at Coimbatore and the number of rainy days fewer. At Coimbatore, the mild summer could not kill the striga seeds in the soil and this treatment cannot therefore be advocated at Coimbatore, though it could be adopted in the Kurnool district.

Cumbu.

Cumbu is the next important millet in this State. The evolution of hybrids in this crop is a new and useful line of improvement and has been found to be promising. Practical methods for the production of hybrids on field scale are being evolved. These investigations are carried on under a scheme partly financed by the Indian Council of Agricultural Research. During the year 1951-52, three hybrids of short duration H. 866, H. 865 and H. 854 were found to be higher yielding than the standard Co. 3 and the first two maturing earlier also. Five hybrids of medium duration compared with Co. 1 in yield tests were also markedly higher yielding than the standard. Three selections P.T. 860, P.T. 862 and P.T. 854 of medium duration were significantly superior to Co. 1 in comparative trials. Trials of hybrids X. 1 and X. 2 in the fields of the cultivators in Srikakulam and Coimbatore districts gave very encouraging results. In Srikakulam, increases in grain yield of 17 per cent over the local in case of X. 1 and 18 per cent in case of X. 2 have been recorded, while in Coimbatore, X. 1 gave an average increase of 38 per cent and X. 2 gave an increase of 47 per cent over the local variety. The demand for the seeds of improved strains continued to be great.

Arisi cumbu.—A.C. 50 a new selection evolved at Ariyalur, was outstandingly superior to the local bulk, recording 49 per cent increased yield of grain. At Koilpatti, Hybrid K. 1 × P.T. 504 was superior to K. 1 in the red soil area.

Ragi.

At the Millet Breeding Station, Coimbatore, a short duration selection of ragi E.C. 4601, maturing 11 days earlier and yielding 16 per cent more grain than ragi strain Co. 2 has been isolated and awaits further trial. Two *Karumsuruttai* selections E.C. 4573 and E.C. 4576 were significantly superior to ragi Co. 1 recording 58 and 54 per cent more grain respectively than the standard. An improved selection of white ragi E.C. 4310, yielding as much as ragi Co. 1 has also been isolated. As the performance of all these improved selections has been consistent, these will be released for district trials. Seven cultures that were comparatively resistant to *Piricularia* were put to severe tests this year but none of these was found immune to *Piricularia* infection. At Narasapatnam, of the 16 promising cultures of *Punasa ragi* tested in preliminary yield trials, seven gave increased yields over the local. In the *Peddapanta* season four selections were significantly superior to the

standard. At Tiruppattur, in yield trials with ragi strains Co. 1 and Co. 2 along with the local ragi Co. 2 was found to be the best. Improved selection R. 382 of Palur was released with station number P. 1. At Ariyalur selection A.R. 45 yielded 34 per cent more grain than the local when grown as rainfed in July-December season. At Koilpatti to improve the yield of K. 1 ragi and to eliminate its lodging habit K. 1 was crossed with K.R. 4 a non-lodging type and the progenies are under examination.

Tenai.

At Coimbatore S.I. 4894 a short duration selection was found superior to the short duration selection of Salem with 17 per cent increased yield of grain. For Tiruchirappalli district, selection S.I. 4946 was found to be superior to the local variety. Two selections S.I. 5017 and S.I. 4975 appeared to be fairly resistant to tenai rust. At Hagari three cultures H.K. 282, H.K. 289 and H.K. 336 gave higher yields than the standard strains H. 1 and H. 2. These will be issued for district trials. Of the 51 cultures studied for rust resistant, 11 recorded less than 15 per cent infection.

Minor millets.

At the Millet Breeding Station, one selection in each of sama and panivaragu, superior to the standard was isolated. At Ongole in a preliminary yield trial with variga (panivaragu), one selection was significantly superior to the local sample. At Ariyalur, varugi selections P.S. 1 and P.S. 76 were significantly superior to the local type in yield tests. P.S. 1 recorded 26 per cent increase in yield of grain, while P.S. 76 gave 35 per cent increase over the local. Three high yielding selections of varagu of short duration were advanced to yield trials. Improved varagu selections A. 11 of Palur, was released with station number as P. 1 having satisfactorily completed its tests.

Seed distribution.—The following quantities of millets seed were distributed from the Millets Breeding Station, Coimbatore :—

	LB.		LB.
Cholam	37,235	Minor Millets	88
Cumbu	35,701		
Ragi	12,592	Total	90,216
Tenai	3,846	pounds (or 40 tons and 658 pounds)	

(c) Pulses.

Research on pulses financed partly by the Indian Council Agriculture Research was in progress at the Pulses Breeding Station at Coimbatore and at the sub-stations at Dharmapuri (Salem) and Vizianagaram (Srikakulam district). The seasonal conditions were adverse for growth of pulses both early and late sown at Coimbatore. Pulses were also adversely affected at Dharmapuri but were good at Vizianagaram due to better rainfall.

The pulses in the wet lands of Samalkota were affected by heavy rains.

Redgram.—Redgram culture No. 37 compared for yield of grain at Coimbatore, gave the highest yield for the third year. This culture was under trials and was also multiplied in seed farms in the districts. It was reported to have yielded 10 to 40 per cent more yield than the cultivators' seeds in the southern districts of the State. Culture No. 97 yielded 30 per cent more than local redgram at Vizianagaram for the third year and two to 12 per cent more than the cultivators' seeds in the Srikakulam and East Godavari districts.

Greengram.—Culture No. 62 yielded 33 per cent more grain than the local for the third year at Coimbatore and has been reported to have yielded 10 to 75 per cent more than the local types in the Tanjore, Tiruchirappalli and Madurai districts.

Blackgram.—Culture No. 212 yielded nearly double that of the local bulk at Coimbatore for the third year and 10 to 20 per cent more than the cultivators' varieties in the Tirunelveli district.

Horsegram.—Culture No. 35 tried for the fourth year at Coimbatore has yielded more than double that of D.B. 7, its average increase in yield being about 40 per cent. Strain D.B. 7 was reported to have yielded 15 to 50 per cent more than the cultivators' varieties in the southern districts.

Bengalgram.—Culture No. 94 yielded 10 per cent more than the old one, No. 482, with an average increase of about 8 per cent for three years. Of the cultures evolved at Vizianagaram redgram No. 97, blackgram No. 189 and horsegram Nos. 76 and 93 were reported to have yielded more than the cultivators' seeds in the northern districts. In the Srikakulam district the horsegram culture No. 93 was finding favour with the cultivators due to its profuse bearing.

In experiments on mixed cropping of pulses with other crops which have been in progress for six years, indicate that a mixed crop of blackgram with cotton was the most remunerative at Coimbatore in the north-east monsoon season, while at Vizianagaram, a single crop of ragi followed by horsegram gave the highest monetary return in years of normal season and mixed crops of redgram and ragi followed by horsegram in sub-normal years. Trials with varieties of "Vegetable pulses" such as table cowpea, cluster beans and soyabeans were in progress.

Seed distribution.—

Pulses for grain—5,153 lb.

Pulses for vegetables—125 lb.

Gram Control Order.—Ninety-six samples of gram and 93 samples of gram dhall involved in blackmarketing cases and forwarded by the Magistrate for identification were examined. Expert evidence on the variety of gram was given in 42 crime cases before 28 courts in different districts.

(d) Oilseeds crops.

Research work on the important oilseed crops of the State, viz., groundnut, gingelly, castor and coconut was continued during the year. The lines of improvement were directed towards the evolution of high-yielding strains or plants with better quality determining optimum cultural and manurial practices to be adopted and finding out the possibilities of introducing mechanical cultivation to reduce cost of production.

1. *Groundnut*.—Among the large number of varieties introduced from foreign countries a spreading variety 'Dixie Runner' and a bunch variety from East Africa with three seeded pods and white seed coat were found useful as economic types. Six spreading selections gave increased yields over the largely cultivated 'Local Mauritius' variety. Five of them gave increased yields over TMV. 3 and two of them over TMV. 1, the standard strains. A selection from the variety 'Virginia Bunch' with large sized pods suitable for desert purpose gave significant increase in yield over the local (control).

The beneficial effect of cattle manure for groundnut, particularly when the season is deficient in rainfall, was once again brought out during the year. The application of potash and phosphoric acid and in combination with cattle manure was found to increase the yields but the dosage proved uneconomic. The ryots may therefore apply cattle manure to the groundnut crop so as to obtain better returns.

Cultural operations were found to benefit the groundnut crop. During the year the cultural treatments ploughing with 'mould board plough' twice and with 'Country plough' four times were observed to give maximum net return.

Rotation experiment conducted during the year confirmed once again the observation made in previous years that the cereals following groundnut yield much better than the cereals following cereals. Therefore it would be advantageous to practice groundnut cereal rotation in preference to the continuous cropping of cereals.

Sowing cotton with groundnut as a mixture simultaneously is better than sowing cotton at the time of first hoeing and weeding of the groundnut crop in dry lands.

A curved *Guntaka* blade 6 feet long hitched behind 'John Deere' tractor was found to be more economical than bullock drawn implements for harvesting the spreading type of groundnut. The tractor drawn implement proved very effective and efficient even when the soil was hard under which conditions the local implements would not be of any use.

The "Ransomes Peanut Picker" (minor) worked with an oil-engine after providing a new set of closely pitched drum and concave, stripped groundnut pods from vines satisfactorily. With this machine the produce from an area of 10 acres could be stripped and cleaned in a day of about eight hours.

In the large scale trial of insecticides against the *Surul* pest dusting twice with D.D.T. 5 per cent at the rate of 20 lb. per acre was found to give remunerative returns. This is a very useful result and by adopting it the groundnut growers can effectively control the *Surul* pest and obtain good return from the crop.

Similarly, in the large scale trials of spraying Bordeaux mixture $\frac{3}{4}$ per cent and dusting thrice with sulphur at 15 lb. per acre were found to control Tikka disease. The ryots can profitably use any of these fungicides against 'Tikka' disease depending upon the facilities available.

The improved strains of groundnut were tested in different centres of the State. The strain TMV. 2 gave an increased yield of 13.1 per cent over the local at Nandyal for the third time this year. At Gurzala and Narasaraopet in Guntur district TMV. 5 (A.H. 6481) gave increased yield and there is a great demand for seed of this strain in that tract. In the black soils at Siruguppa, the TMV. 2 strain gave increased yield of 36 per cent over the local. In the black soil at Kovilpatti the bunch selections A.H. 4111, A.H. 4218 and A.H. 6481 proved successful giving increased yields over the standard strain TMV. 2. The selection A.H. 4111 gave 37 per cent increase over TMV. 2 strain. The strain TMV. 2 gave good yields when raised in single-crop wet lands during summer in Kaikalur taluk of Krishna district, Pattukottai in Tanjore district and at Coimbatore.

2. *Gingelly*.—Among the several cultures obtained from various States, the strain from Uttar Pradesh proved earlier than TMV. 2 a short duration strain evolved in this section. The performance of the new strain will be watched further and its superiority over the local strains determined.

A spacing of 1 foot $\times$ 1 foot for the crop grown under irrigation was found to be optimum. Hence the crop when sown broadcast may be thinned to a spacing of 1 foot $\times$ 1 foot. If plants are crowded or found wide apart the growth and yield are adversely affected.

The strains TMV. 1, TMV. 2 and TMV. 3 were tried in different parts of the State. TMV. 1 gave increased yields in Allagadda in Kurnool district and TMV. 3 in Musiri taluk of Tiruchirappalli district and in Parvathipur of Srikakulam district. The strains TMV. 1 and TMV. 3 can be grown in these tracts with profit.

3. *Castor*.—The variety obtained from the Italian Federation of Co-operatives and the variety from South Africa were found to be of very short duration ($4\frac{1}{2}$ months). They were utilized for evolving high yielding short duration types.

Among the selections tried, two gave significantly higher of 19 per cent and 25 per cent over the standard strain TMV. 1. They were also found to be shorter in duration by a month to a month and a half. This is definitely a great advance in castor improvement work.

The strains of castor TMV. 1, TMV. 2 and TMV. 3 were tried in various parts of the State. The TMV. 1 strain gave increased yield in Ramanathapuram district, TMV. 2 in North Arcot, South Arcot and Ramanathapuram districts and TMV. 3 in Nellore, Guntur and Krishna districts. There was a great demand for seeds of perennial castor from the Nilgiris and West Coast as it was found to withstand heavy rainfall conditions.

4. *Coconut*—(a) *Cultural and manurial operations*.—Coconut trees have been found to respond well to regular cultivation and manuring. In order to improve or maintain a coconut garden in good yielding condition the garden has to be systematically cultivated and manured.

(b) *Increasing the humus content of soil*.—*Crotalaria striata* was recommended as a suitable green manure crop for coconut gardens on the West Coast. The ryots are advised to grow this green manure in their coconut gardens and cut and incorporate it into the soil, when they are 3 to 4 months old.

(c) *Subsidiary crop for coconut gardens*.—From the trials conducted during the year, it was found that Elephant yam could be successfully grown in the shade of the coconut trees. Growing of this subsidiary crop will be a source of additional income to the coconut grower.

(d) *Coconut breeding*.—Progeny palms of Tall × Dwarf crosses, continued to give yields. The oil content and other economic characters compared favourably with that of the superior Tall parent. The seedlings of Tall × Dwarf crosses were in great demand and their superiority is clearly borne out by the keen demand. For large scale production of these seedlings 124 inflorescences of the Tall 'mother' palm were pollinated with pollen from Dwarf parents to get hybrid nuts.

(e) *The depth of planting coconut seedlings*.—The proper depth of planting coconut seedlings in littoral, barren sandy soils, may be limited to 3 feet, as planting at greater depth was not found beneficial.

(f) *Watering the coconut*.—Pot watering the coconut during the rainless summer months increased the yield of coconuts. This gives the indication that coconut cultivation could be made more profitable, if irrigation facilities can be made available or planting is undertaken in places where there are adequate irrigation facilities.

(g) *Exotic varieties*.—Laccadive ordinary, Laccadive small, Andaman ordinary and Phillipines were found to be promising economical forms among the exotic varieties.

(h) *Control of rhinoceros beetle*.—Spraying the crowns of adult coconut trees with Guesarol 580 at weekly intervals was found to be effective in reducing the incidence of this pest, though it could not completely prevent the attack.

5. *Seed distribution*.—The following quantities of oilseeds were distributed :—

	LB.
Groundnut	35,000 (pods) and 244 (kernel)
Gingelly	1,325
Castor	4,137
Coconut seedlings	163,390 (numbers)

(e) *Cotton*.

Research work on cotton was carried on at the Cotton Breeding Station, Coimbatore, and at the Agricultural Research Station, Muguppa, Nandyal, Hagari, Palur, Pattambi, Guntur, Mangalore, Keshwar, Koilpatti and also at Adoni, Narasaraopet and Srivilliputhur.

The season during the year was generally unfavourable both for American and desi (local) cottons grown in the State.

Research.—The research work covered practically all the commercial varieties grown in the State were conducted. Trials in new regions, e.g., irrigated soils of the Tungabhadra and lower Kaveri Project areas, off season fallows in rice lands in deltaic areas, West Coast districts of Malabar and South Kanara, and back lands waste lands and bunds along water channels in all districts. Improvement work included problems of increasing yield, quality, resistance to pests and diseases and drought, and maintenance, multiplication and distribution of pure seeds. Part of this work was carried on partly financed by the Indian Central Cotton Committee. Eighteen schemes were in operation in the section. Another important new work taken up was the certification of the improved varieties of cotton MV. 1 to enable the growers to get better price for their produce.

(1) *Irrigated Winter Cambodia (Cotton Breeding Station and Cotton Research Centres, Avnashi and Tiruchengode)*.—The breeding objective is the evolution of long stapled American cottons, with a minimum of 1-1/16 staple, 38 per cent ginning and suited for cultivation in the Central and Southern districts of the Madras State. Three selections, namely, 0734, 9995 and 9030 were found to be consistently good yielders throughout the range of conditions sampled. One of these, namely, 9,030, excelled Madras Uganda 1 in mean halo length and ginning percentage as well. Preliminary district trials, conducted during this season, indicated that 0734 and 9030 are likely to prove suitable for replacing Madras Uganda 1 in the winter sown areas.

(2) *Irrigated Summer Cambodia (Cotton Research Centre Srivilliputhur and Agricultural Research Station, Palur)*.—The object of this item of research is the evolution of early maturing long stapled cottons (1-1/8 inches) for the summer planted area and the isolation of Barbados varieties or hybrids suitable for

cultivation in the Coastal belts of South Arcot district. The time of planting trials, conducted at the Agricultural Research Station, Palur, clearly indicated the advantage in sowing in the last week of August or early September rather than in December as practiced in this tract. Of the seventeen cultures that were in the trials cultures 0604-A-4 and 0484-A-1 which are crosses involving 7733-D-21 and 7727-A-12 with Co. 4, B. 40 and 7682 are very promising so far. The culture 0538-35 is outstanding for halo length and vegetative vigour. A large number of hybrid (inter-specific, inter-hirsutum and intra-barbadense) progenies are in various stages of trial.

(3) *Irrigated American Cotton for the black soils of Ceded districts (Agricultural Research Station, Siruguppa).*—The object is the breeding of irrigated American types suited for the black soils of the Ceded districts that are likely to command irrigation under the Tungabhadra Project. In spite of severe droughty conditions that prevailed in almost all the centres of trial in the district G. 1 × Co. 2. 9-3 (laxmi) cotton has been once again found to be a prolific yielder, far superior in quality to the local cotton. It is also gratifying to note that the performance of this cotton has been equally good under unirrigated conditions also. Its average yield during the year is estimated to be 3.34 maunds (82-2/7 lb.) of seed cotton under rainfed conditions. In the yield trials conducted at the Agricultural Research Station, this cotton has registered a twenty-two per cent increase in 'seed cotton' yield over control. Among the other cultures that were in the advanced stages of trial at the Agricultural Research Station, the inter-specific hybrid types 125 × Co. 2 and 170 × Co. 2 were found to be very promising. In the studies for blackarm resistance 'culture 2196' maintained its previous performance: Similarly in the studies for jassid resistance 'Culture 1821-1-1' continued to maintain its resistance.

(4) *Unirrigated Americal Cotton for the black soils of Ceded districts (Agricultural Research Stations, Hagari and Nandyal).*—The object of this work is to replace the low yielding and poor ginning 'westerns and northern cottons' with suitable American types capable of thriving under rainfed conditions in the black soils of Ceded districts. In the yield trials conducted at the two centres, among the twenty cultures under test, G. 1 Co. 2-9-1 (Laxmi) was found to be the best. Next to this MA. II reselections were productive. Among them 'Culture 330' was the most outstanding.

(5) *Unirrigated American Cotton for southern district (Cotton Research Centre, Periyakulam).*—The object of the work is to evolve hardy types of American cottons of 15/16 inches staple that would thrive well under unirrigated conditions in the Central and Southern districts of the Madras State capable of yielding one-third bale of lint per acre. In spite of unfavourable conditions an average yield of 633 lb. of 'seed cotton' per acre was obtained during the year, from Madras Uganda 1. Among the several

cultures that were under test '7604-8' was found to be better than 'Madras Uganda 1' in yield, halo length and ginning percentage; 'culture 4-4-1-2/2-5/1' was found to be higher yielding than control and culture 'Co. 4. B. 40-8-2/2' was found to be better than control in yield and ginning percentage. It was as good as control in mean halo length.

(6) *Unirrigated Sea Island Cotton (Agricultural Research Stations, Pattambi, Nileshtar and Mangalore).*—The object of the trials is to explore the possibilities of fitting in 'Sea Island,' either as a pure crop in *modan* and *kumeri* lands or as an inter-crop in coconut gardens, in the coastal districts of Malabar and South Kanara. The yield data obtained for the two Sea Islands cotton varieties, namely, St. Vincent and Montserrat, as pure and inter sown crops, showed that the former variety is preferable to the latter on account of its hardiness, high yield, better ginning percentage and optimum fibre properties. It was also found from the trials that transplanting pre-monsoon raised seedlings definitely increase the yields—two fold over the yield obtained by the practice of planting Sea Islands cotton in June with the onset of the monsoon. The results of the manurial experiments showed that there was a response to the application of ammonium sulphate only if a basal dressing of lime was given: increased yield was obtained over the unmanured plots, in the slightly acidic soils at Pattambi. The 'Micro' spinning test of a sample of this cotton yielded a yarn of 104 counts. The fibre test results indicated the improvement in respect of maturity, strength and regularity of fibres over those obtained during the previous season.

(7) (a) *Unirrigated Karunganni (Cotton Breeding Station, Coimbatore).*—The object is to evolve suitable Karunganni strains better than K. 5, in ginning percentage, mean halo length and fineness of fibre. Tinnevelles and Karunganni cottons improvement scheme functioning at Koilpatti with a sub-station for work at Coimbatore has a similar objective, namely, evolution of *Desi* cottons with spinning value of 40's suited for the entire unirrigated black soils of Central and Southern districts. In the advanced stages of yield trials, most of the seventeen cultures under trials were found to be superior to K. 5 in yield. In mean halo length and ginning percentage, the Koilpatti culture, was found to be better than 6874, 6188 and 6186 and Coimbatore selections 5341, maintained their superiority over K. 5.

(b) *Unirrigated Tinnevelles (Agricultural Research Station, Koilpatti).*—The object of the work is evolution of *Desi* type of cotton spinning up to the 40's WARP counts and adaptable to the entire *Desi* cotton growing unirrigated black soils of Central and Southern districts. Seven cultures had shown improvements over control in halo length and ginning percentage. In yield they have been either equal to or better than control (K. 2). One culture, namely '6434-4-D' registered an improvement over

ntrol in all the three economic characters, namely, yield, halo length and ginning percentage.

(8) *Unirrigated Nadam (Cotton Breeding Station, Coimbatore).*—The object of the work is the evolution of an early maturing type of *Desi* cotton of medium staple with a view to replace the existing coarse perennial *Nadam* variety that is now cultivated in the poor, gravelly soils of the Erode taluk of Coimbatore district. Though this problem of *Nadam* cotton may vanish to a great extent with the inauguration of the Lower Bhavani Project, still there will be a few patches which will not be benefited by the project. It is to cater to such areas that this breeding work is carried out. The yield trials during the year once again indicated that 'B. 32-48/51' is better than K. 5. It also retained its fertility.

(9) *Unirrigated Cocanadas (Cotton Research Centre, Arasaraopet, and Agricultural Research Station, Lam).*—The problem is to improve yield, halo length and colour of lint. The improvement already effected resulted in the release of Cocanadas 1. It is proposed to improve further both quality and colour. The new strain 336-B (renamed as Cocanadas-2) maintained its superiority over local and C. 1 in lint characters while being equal in yield of kapas. Among the cultures under study a few indicated definite improvement in colour of lint while being as good as C. 2. in yield.

(10) *Unirrigated Northern (Agricultural Research Station, Nandyal).*—The breeding objective is to evolve adaptable *arboreum* types as good as N. 14, in quality but better in yield and/or ginning percentage. Four promising cultures that were under district trials were found to be more adaptable than N. 14. One culture '5838' was found to be promising with all economic characters.

(11) *Unirrigated Mungari (Cotton Research Centre, Madani).*—The object of breeding is to isolate medium quality cottons equal to 881F in yield but earlier in duration and higher ginning percentage. In the district trials the three K. types continued to maintain better yields than 881-F. Cultures 3930-A and 3943-B were as good as 881-F in yield but showed improvements in halo length. Among the early types H. 420 was found to be as good as 881-F in halo length.

(12) *Unirrigated Westerns (Agricultural Research Station, Hagari).*—The object of this item of research is the evolution of medium staple (13/16 inches), *herbaceum* type of cotton with ginning percentage of 33, early maturity drought and wilt resistant and capable of spinning 30's warp counts. In the district trials conducted with eight hybrid cultures none was found better than Westerns 1 though one selection, namely '4136' recorded a high yield of 'seed cotton' per acre in one of the centres. The reason for the poor performance might be due to unusual drought and unfavourable season.

(13) *Perennial cottons (Cotton Breeding Station, Coimbatore).*—The object of this work is to select suitable type of perennial cottons which can easily be raised in backyards of houses, vacant sites, along field bunds and water courses, etc., and thereby achieve an area increase under cotton without encroaching on food crop area. Among the various perennial cottons 'moco' was found to be the best adapted for varying conditions and therefore it was multiplied and distributed over the entire State. 'Caramura', a new introduction from Brazil, was found to be profuse in squaring with better staple, has been arranged to be tested in all the Agricultural Research Stations of the State along with 'Moco.' In addition to the distribution of Moco seeds in this State, 30 lb. of seeds were distributed to the Indian Central Cotton Committee for trials in other States in the Indian Union.

(14) *Wild cottons (Cotton Breeding Station, Coimbatore).*—The object of this item of work is to introduce pest and disease resistant qualities from wild parents like *Darwinii*, *taitense* and *raimondii* to cultivated American types and to transfer genes for fineness of lint from *G. Ananolum* to cultivated Asiatics. In the trials in progeny rows, 19 of these derivatives of wild cottons in the 5th and 7th generations were found to be earlier than Madras Uganda 1 and were also found to possess good economic characters like halo length and ginning percentage. These would be tested further. Among the *ananolum* hybrids the only culture that was found to be fine, proved to be a poor yielder.

(15) *Fundamental studies (Cotton Breeding Station, Coimbatore).*—Mutant forms covering the anthocyanin pigmentation, dwarfness, lintlessness, short lint and immature fibres were maintained. Studies of inheritance of short and immature lint indicated a hybrid ratio for the segregation of the characters. Crosses have been effected for the study of inheritance of fibre fineness.

(16) *Seed storage (Cotton Breeding Station, Coimbatore, with sub-stations at Nandyal, Hagari, Guntur, Koilpatti and Srivilliputtur).*—The enquiries were directed towards assessing the field performance of fresh seeds and of those carried over one season. The results indicate that yield, ginning percentage and mean halo length are not affected by sowing one year old seeds. The trials show that seeds left over as unsold in an year in seed distribution schemes may be safely recommended for sowing in the subsequent year. The seed rate will, however, have to be increased, due to loss in viability, if any, found.

(17) *Pre-soaking trials (Cotton Breeding Station, Coimbatore, with sub-stations at Koilpatti, Guntur, Nandyal and Hagari).*—In order to test the favourable results reported at Indore on the effect of pre-soaking cotton seeds in nutrient solutions, co-ordinated trials were carried out at different agricultural stations testing molar, half molar and quarter molar solutions of mono potassium phosphate and ammonium sulphate in comparison with water

soaked and dry seeds. The results indicate that in general the pre-soaking of seeds neither affect field germination nor yield.

(18) *Spacing experiments* (Cotton Breeding Station, Coimbatore).—In order to get confirmatory data on the previous findings at the Cotton Breeding Station, 3 inches and 9 inches spacings in the row (spaced $2\frac{1}{2}$ feet apart) were tested with strain Madras Uganda 1 under irrigation. The results indicate that there is no difference in yield, halo length and ginning percentage by adopting wide or close spacing.

(19) *Cotton in rice fallows* (Agricultural Research Station, Aduthurai, Pattukkottai, Palur, Anakapalle, Maruteru, Samalkota, Siruguppa, Kankanady, Taliparamba, Pattambi, Central Farm, Coimbatore and Bapatla).—Based on the encouraging results obtained from the performance of early American varieties of cotton in rice fallow trials at the Agricultural Research Stations, Aduthurai, Pattukkottai and Palur, co-ordinated trials in thirteen research stations of the State representing delta and non-delta areas were undertaken with a view to (a) isolating suitable early American variety of cotton for growing in paddy lands with irrigation, (b) to assess the response of P. 216-F for manuring with ammonium sulphate at 40 lb. nitrogen per acre, (c) to fix the optimum sowing time for each area, (d) to assess the residual effect of growing cotton on the succeeding paddy yield. The data gathered so far seem to indicate that economic yield can be obtained at Aduthurai and Pattukkottai in delta area and Central Farm in the non-delta area. Probable reasons for low yields in most of the other stations, are very low-temperature prevailing in the initial stages of crop growth and very high temperature prevailing during finishing phase of flowering. P. 216F has given satisfactory yield when sown a month after the harvest of paddy in Aduthurai, Pattukkottai and Coimbatore. Madras Uganda 1 has given higher yield at Central Farm, Coimbatore, than at other centres. P. 23F found to be earlier than P.216F has given more or less identical yield. Response to manuring was observed in all places of trials. Shoot borer was widespread at Aduthurai and blackarm attack was severe at Pattukkottai. Preventive measures helped to reduce jassid attack; copious irrigations reduced the severity and delayed the onset of red leaf.

(f) Sugarcane.

Research in sugarcane was carried on at the Sugarcane Research Stations, Anakapalle and Gudiyattam and results achieved were tested at the sugarcane Liaison Farms, located near factory areas in Samalkota, Hospet, Nellikuppam and Kulittalai. The research and development work are financed partly by the India Central Sugarcane Committee. The season for sugarcane can be considered to be more or less normal but for the cyclonic winds that prevailed in November.

Sugarcane varieties.—One hundred and forty varieties were under study at Anakapalle and the following were found promising :—

Early season—Co. 719 and 727.

Mid season—Co. 750 and 785.

Late season—Co. 705, 729, 733 and 734.

In preliminary yield trials Co.684 was found promising. Under swamp conditions Co.419 continued to be the best.

Manurial experiments.—No conclusive results were obtained in the trials conducted to determine the proportion of organic to inorganic form of concentrated manures to be applied to sugarcane. In the permanent manurial experiment, the continuous application of ammonium sulphate to sugarcane and its rotational crops recorded better yields than no manure or cattle manure.

In the maximization of yield plot, the "plant" crop gave 63.87 tons of cane per acre while the "ratoon" gave 52.44 tons of cane per acre.

Sugarcane chemistry.—Studies on the availability of nitrogen disclosed that the treatments manured at planting showed a higher initial peak of nitrate in the soil, but the same was not neglected in uptake of nitrogen by the plant while those manured 50 days after planting showed a higher nitrogen uptake.

Studies on the composting of cane trash with pig-dung and cow-dung confirmed that the former hastened decomposition. This result is however, not in conformity with the findings of the trial conducted by the Agricultural Chemist at Coimbatore. The study on the use of the clarificants in the manufacture of jaggery revealed that pH.6.4. in juice is the optimum for good setting and good colour in jaggery.

Sugarcane physiology.—Water requirement experiments of ratoon crop indicate that irrigation given once in 12 days gives better yield than irrigation given once in 18 or 24 days. Pot culture studies of manure in relation to water requirements indicate that organic form of nitrogen has to be preferred under low moisture conditions. Ammonium sulphate was more efficient under high moisture conditions and at such high soil moisture conditions, the form of manure did not affect the quality of cane juice to any appreciable extent. It has been found possible to prevent lodging of canes by a cheaper method of propping by "trash" twist in cases of crop giving up to 45 tons of cane per acre.

Sugarcane mycology.—Most of the agronomically promising varieties were found to be resistant to red rot, while Co.449 and 527 were found less susceptible. Varieties like Co.419, Co.475 and Co.620 were susceptible. The loss due to smut may amount to 39 per cent if crop is badly affected.

Sugarcane entomology.—Among methods recommended for control of sugarcane borer spraying with 0.32 per cent DDT was

found to increase yield appreciably. Sprayed plots showed lesser borer infestation. Biological control of the "early shoot borer" by releasing of *Trichogramma* parasite in three districts was noted to have checked the pest to a small extent. The estimate of loss through early borer infestation showed that Co. 527 suffered less than Co. 419 or Co. 475.

Sugarcane Liaison Farms.—In varietal trials Co. 527 and Co. 475 for Samalkota, Co. 449 and Co. 475 for Hospet, Co. 527 and Co. 471 for Nellikuppam and Kulittalai areas were found suitable as "early" season canes. For the "Mid season Co. 449 was found suitable in all the four centres. Co. 619 at Nellikuppam and Co. 467 at Kulittalai were found better than Co. 419 as "late" season canes.

In ratooning trials, the ratoons were inferior to plant crops in all varieties and in all centres except at Kulittalai. Second ratoons were poorer than first ratoons. In manurial trials 250 lb. nitrogen per acre was found to be the optimum at Hospet. In Samalkota and Hospet, higher proportion of Ammonium sulphate in manure mixture increased the yield but affected juice quality. In Nellikuppam higher proportion of organic form of nitrogen was found to increase yield. In Samalkota, application of concentrated manure in one or two doses before June and in Nellikuppam, four months after planting was found beneficial. In Samalkota, propping trials with trash twist method was found cheaper. At Hospet, sugarcane after paddy was better than sugarcane after sugarcane. At Nellikuppam 'Adasali' cropping was found uneconomic. At Kulittalai, Co. 471 was found suitable for the special season (August–September).

(g) Fruits.

Research in fruits was in progress at the Fruit Research Station, Kodur Pomological Station, Coonoor, and the Fruit Farms, Kallar and Burliar. Small orchard areas are set apart in the Agricultural Research Station at Anakapalle, Guntur, Coimbatore, Taliparamba, Wynaad and Araku. Model orchard-cum-nursery scheme was initiated at Peddapuram and Periyakulam. Lands were first acquired at Thimmapuram and Mangalore while at the fifth centre at Giddalore land acquisition proceedings were progressing. A suitable site of 30 acres at Mangalore for the Central Cashew Research Station, was selected and acquisition proceedings were in progress. In order to provide a nucleus of personnel trained in vegetative propagation methods, a new scheme of training was started by deputing skilled propagators from fruit stations to the Agricultural Research Station for training the mazdoors there and 104 mazdoors were thus trained.

Fruit Research—Mango.—The flowering in mango during the year was unusually heavy but due to subsequent drought and the generally adverse climatic conditions, the harvest proved disappointing. At Kodur, the highest yield from a single tree was

recorded in variety Bangalora (Tree No. 2/1) with 1,703 fruits weighing 927 lb.

Grafts of 12 varieties, either not represented or inadequately represented in general collection were newly obtained and planted at the Fruit Research Station, Kodur. A total of 1,168 controlled pollinations using desirable parental combinations were made during the year resulting ultimately in 13 'crossed' fruits. From among the previous crosses, 56 trees fruited, of which 16 died so far the first time and four of these exhibited superior fruit quality.

In the field trials, among the polyembryonic rootstocks employed, Pahutan for Baneshan and Olour for Neelum proved superior to others with mean tree yields of 290 and 836 fruits respectively.

Citrus fruits.—The general yield performance was not satisfactory due to adverse season. Among the varieties that yielded a crop at Kodur, two of sweet orange, two of pummelo, one in each of lemon and marmalade orange and the vadalapudi orange registered a relatively satisfactory performance. At the Araku Valley Fruit Centres, the sweet orange varieties: Malta Ruby Sathgudi, Tennerrife and Washington Naval, trees of which are in the fifth year of their orchard life, continued to perform well. Among the four-year old mandarin orange trees, the fruits of Nagpur Santra on Jamberi rootstock excelled in quality over others. Five suspected bud-sports in Sathgudi orange, four for unusually heavy cluster-bearing habit and one for off-season cropping were located at Kodur and their clonal progenies propagated. Analysis of fruits of pink-fleshed Vadalpudi orange mutant for brix/acid ratio showed them to be superior to the local type. Similar analysis of Sathgudi oranges from trees on different rootstocks indicated that fruits on Sathgudi rootstock ranked first, while those on Gajannimma were rated as the most inferior. In the acid lime rootstock trial, one tree on Gajanimma rootstock gave a record yield of 7,584 fruits though the yield differences between trees on the several rootstocks and the seedlings were not significant. In the newly established rootstock trials at Kodur, Sathgudi and acid lime on Jamberi rootstock registered the best growth in the first year of orchard life.

In the rootstock trials for the mandarin orange at Kallar, the growth of the trees on pummelo and sweet lime was the poorest. Though in two of the observation plots, Jamberi rootstock proved vigorous, in a third plot with older trees (about seven years in age) the trees on this stock exhibited signs of gumming, distortion of bud joints and varying degrees of dieback.

At Wynaad, in propagation trials with mandarin orange Jamberi and sweet orange rootstocks gave a higher success than the others; it was further seen that stocks with a diameter between 0.75 cm. and 1.25 cm. registered a better 'take' than those of

greater girth. Budding operations in March gave better success than in other months.

Hybridization work in Citrus was newly taken up during the year. Seventeen 'Crossed' fruits involving four parental combinations in three lemon varieties were obtained and their seeds sown for further study. In sweet orange, 200 crosses between four parents of three varieties were made. Taxonomical studies of the several Citrus seedling trees in the collection at Kodur were completed and their classification worked out.

Apple.—The growth and yield performance of Rome Beauty apple on Merton 779 and 778 was the best among five rootstocks under trial. Grafts of six new varieties were propagated from scion material obtained from New Zealand and added to the collections. The oil spray trials to hasten blossoming and promote yields were extended by employing Sandolin 'A', a proprietary product, besides linseed oil already successfully in use. The new product hastened flowering in the variety winterstein by 26 days while the linseed oil advanced the flowering only by eight days over the untreated trees. The mean tree yield of fruits under the treatments in the order mentioned above, were 590, 325 and 295 respectively.

Plum.—The early signs of incompatibility exhibited by *Czar* and *Gavieta* scions on plum seedlings stocks were further accentuated during the year. The anticipation, therefore, that these rootstocks may prove more suitable material than the common peach seedling has not been realized. The pruning trials in progress with as many as three varieties have now established that "long" or light pruning in plums is to be preferred to the erstwhile practice of "short" or severe pruning.

Peach.—Trees of Red Shanghai and Shanghai Seedling propagated on eight month old common peach seedling stocks continued to be more vigorous than those propagated on older ones, though the yield differences showed no significant differences. The beneficial effects of 'long' pruning in Killikrankie were confirmed from the data collected in the year under review.

Persimmon.—Propagation of this fruit by "shield" and "flute" budding on *Diospyros lotus* seedling stocks did not meet with success though inarching and whip-grafting on the same stock proved feasible.

Mangosteen.—Though the Y cutting nurse method of propagation gave indications of early union with 'mangosteen seedling stocks', the grafts did not survive after separation from the parent trees. In spite of the very exhaustive work done towards the vegetative propagation of this fruit over the past decade, the problem yet remains largely unsolved.

Jack.—A review of the performance of the Singapore Jack at the several Agricultural Research Stations brought out that its performance, with particular reference to its prococious bearing

habit, was satisfactory only in tracts with rainfall above 50 inches and generally high humidity. A consignment of 1,100 seeds of this variety was newly obtained from Ceylon and the seedlings raised therefrom were distributed to the growers.

Six selections of individual trees of merit in the tract were made and their clonal progenies were raised by inarching for further trials.

Hybridization work to combine desirable characters such as precocity, prolific bearing, off-season cropping tendencies and superior fruit quality was newly put under way at Coimbatore and Burliar.

Breadfruit.—Propagation trials by the modified method of gooteeing of root-suckers gave no success. Pre-treatment by partial dehydration of root cuttings (reported to have succeeded elsewhere) proved of no avail in making them sprout.

An interesting finding in the year was the appreciable increase in fruit size (by about 50 per cent) effected by hand pollinating the female spikes with jack or breadfruit pollen though the fruits continued to remain seedless.

Annonaceous fruits.—Hybridization work was put under way by effecting crosses between custard apple, bull's heart, cherimoya and soursop. These crosses were under observation at the end of the year under report.

Among the rootstocks for custard apple under observation, bull's heart was found to be superior to the rest. Soursop, on the other hand, proved incompatible.

Durian.—In a monthly inarching trial, a cent per cent success was obtained in October operations with durian seedlings stocks.

Litchi.—Air-layering of shoots by cincturing was found to be an elegant and cheap method of propagation for this fruit.

Sapota.—Hybridization work to combine the superior fruit quality of the oval variety and the large fruit size of the cricket ball variety was put under way at Coimbatore.

Papaya.—Sib-mating of the several types obtained from different sources within the States as well as from elsewhere was taken on hand newly for the development of pure types of economic value.

Guava.—Hybridization work in guava was commenced newly and seeds from seven 'crossed' fruits involving combinations between four promising varieties were extracted and sown.

Other miscellaneous fruits.—New fruit introductions at the Fruit Research Station, Kodur, included one variety of custard

apple, two of date and one of zizyphus. At Coonoor, an yellow-fruited passion variety introduced from Ceylon came to bearing thirty months after planting. Seville lemon with prococious bearing and prolific yields was a successful new introduction to the Nilgiris hill ranges. The progress of Cassinirea and loquat advance introduced from the United States of America and brought under trial at the hill fruit stations was satisfactory. In strawberry, the multiplication of the clonal progenies of the high yielding 'lines' was taken on hand for distribution of planting material to the growers.

Vegetables and tuber crops.—The improvement work on brinjal and bhendi was pursued on planned lines and single-plant selection were made for purification and breeding purposes. Seeds of five pure lines in brinjal were obtained from Indian Agricultural Research Institute, New Delhi, to expedite the work of putting into the hands of the growers, hybrid seeds which would give increased yields.

The trials with tapioca, colocasia and elephant yam at the several fruit stations and centres were concluded and the varieties and types suitable for the several regions of the State were indicated for extended cultivation.

A batch of Canadian tomato varieties designated as "determinate" and "indeterminate" depending on their habit of growth, were brought under trial at the College Orchard, Coimbatore. Most of the former types recorded satisfactory performance, that of Ottawa To-17, Early Chatam and Monarch being outstanding, with estimated acre yields ranging from ten to eleven thousand pounds. Among the "indeterminate", the yields of Ottawa To-5 and Carleton only were fair, being between 6,000 lb. and 7,100 lb.

Other economic crops.—In cacao, nearly 12,000 seedlings of the Criolle variety were raised for extensive distribution and trial in regions considered as suitable for this beverage crop, in addition to extending the area at the Kallar and Burliar Fruit Stations.

In pyrethrum, the multiplication of the clonal planting material of selected high-yielding individual plants continued to be in progress.

With the spice crops, clove and nutmeg, promising results were obtained in the vegetative propagation trials. In clove, a cent per cent success was obtained in July, September, October and November operations using clove seedling stocks for inarching. Similarly with nutmeg, 90 to 100 per cent success was obtained in June to December operations when inarched on its own seedlings stocks. It was also found feasible to inarch shoots of this spice tree on *Myristica beddomei* seedlings. An interesting off-shoot of the work on nutmeg was the extraction of an essential oil from the leaves which has given indications, among other uses, of being an effective weedicide.

Supply of plants.—The following statement furnishes the details of plants supplied and seeds made available to indentors in 1951-52 along with those of 1950-51 as a comparison:—

Fruit nursery or centre.	Number of plants supplied.		Quantity of seeds distributed.	
	1950-51.	1951-52.	1950-51.	1951-52.
1 Government Fruit Nursery, Kodur	4,410	12,029	..	..
2 Pomological Station, Coonoor.	..	11,733	..	6
3 Kallar Fruit Station	15,439	3,745	8,451	24
4 Burliar Fruit Station	..	4,850	..	18
5 College Orchard, Coimbatore.	8,153	7,095	49	78
6 Fruit Centre, Anakapalle	18,867	15,007	1,106	979
7 Fruit Centre, Wynad	38,985	20,766	..	711
8 Fruit Centre, Taliparamba	18,234	11,864	617	40
9 Fruit Centre, Araku	480	1,319	..	30

In order to meet the very heavy demand for nursery stock from departmental centres, a new scheme for the propagation of fruit plants from promising trees in the several Agricultural Research Stations and in their vicinity was put newly under operation in the year under report. Under these proposals, it has been estimated that about 9,000 plants will be available for supply by the end of December 1952.

For building up rootstock material in mangoes again, a new scheme was launched by which the district staff are to collect mango stones in large numbers which become available in market yards, etc., during the season and send them to the various departmental centres for sowing. By this means it was possible to raise adequate number of seedlings for grafting purposes and this scheme has therefore been put again into operation in the 1952 season.

(h) Bananas.

Research in banana is carried on mainly at the Central Banana Research Station, Aduthurai. Collection of important varieties are also maintained at the Agricultural Research Stations for supply of suckers.

Varietal studies.—With the addition of 21 varieties during the year the total collection of varieties No. 150. The duration of these varied from 280 days to 548 days.

Hybridization.—Two hybrids between monthan and *Musa coccinea*, a dwarf variety was produced.

Mutants.—Two mutants—a medium tall type of the Australian variety mont-marie and another—a rasthali with high-grade of fruits, were spotted.

Propagation studies.—Sword suckers were found to be better than broad leaf suckers of the same age in height, girth and leaves produced.

Suckers raised from mother combs were the first to complete flowering.

Monthly planting trials indicate that June, September and October for Poovan and June, July and September for Monthan, were the best in height and girth measurements.

Plantation practices.—Ratooning, spacing, Mattocking and Manuring trials were in progress. Desuckering trials indicate that the treatment of removing all suckers except one after a plant flowers, was the best.

(i) Pepper.

Research on pepper, partly financed by the Indian Council of Agricultural Research was carried on at the Agricultural Research Station, Taliparamba pending selection of site for the permanent station. The site for the new research station at Panniyur was taken over in April 1952 and 25 acres have been cleared and the following experiments laid out:—

- (1) Manurial experiments.
- (2) Standard-cum-shade experiment.
- (3) Economics of cultivation of the five standard varieties.

Pepper varieties from Malabar, North Kanara, Travancore, Assam and Ceylon were obtained and raised in baskets. More than 3,000 vines in Malabar were studied with a view to take over the promising once to the new station. Studies indicate that hermaphrodite forms of pepper varieties are the best in production and the degree of hermaphroditism varies from variety to variety. In Malabar, many a pepper garden was found to be unproductive due to having either male or female forms. Therefore, there is scope for scientific selection of suitable planting material.

(j) Cardamom.

Research in cardamom was carried in the plantations of Messrs. Bombay Burma Trading Corporation, Limited, on the Singampatti Hills in the Tirunelveli district.

Botanical studies.—Varieties and types of cardamom collected came to bearing during the year giving an opportunity for study of panicles, capsules and growth of aerial shoots.

Hybridisation was continued and 298 seedlings were raised.

Agronomic studies.—Varieties and types under yield trials have given the first harvest during the year. Rhizomes from profuse tillering clumps were superior to those from poor tillering clumps. A large number of aerial shoots was produced earlier by planting longer (8 inches) rhizomes.

Entomological studies.—Studies on the life history and habits of the cardamom thrips a serious insect pest was continued. These were found to increase in dry weather and decrease during wet weather. DDT spray at 0.25 per cent strength was found to be as good as nicotine sulphate and Gammexane in controlling thrips confirming last year findings.

Miscellaneous studies.—Trials indicate that short sheds 3 feet—0 feet long or better for cardomom nurseries giving best germination.

Clump rot was arrested by the application of lime and the affected clumps revived by the application of ammonium phosphate and super phosphate.

(k) Root crops.

Tapioca, sweet potato and ginger.—A scheme for research in tapioca and sweet potato was run at Bapatla, Coimbatore and Pattambi. Some American and Chinese sweet potato varieties were found to be high-yielding with delicious taste as well. While nitrogen was not useful for sweet potato in the rich soils of Coimbatore, it was found to increase yield in the laterite soils of the West Coast.

Studies on ginger were continued at Pattambi on various aspects varietal, agronomic and pathology. Cattle manure was found to be the best. Mulching and leaving a part of the crop in the field was found to be the best way of preserving seed material.

(l) Chillies.

Season.—The season was very adverse to the chilli crop. The crop after transplanting suffered due to drought. Thrip incidence was also severe during the year.

Crop improvement—Chillies.—The trial of G.1 and 1402 chilli on cultivators holdings in the districts was continued for a second season. The mean yields recorded in 16 centres were 1,194 lb. for 1402, 1143 for G. 1 of dried chilli per acre as compared to 772 lb. per local. The results obtained are in conformity with the data gathered last season. The new strain 1402 has on an average recorded 55 per cent more yield than local and 5 per cent over G. 1.

Eight cultures were compared for yield but difference was not significant.

G.1. 193 a reselection in G.1. was more productive than G.1. the parent. Culture Goa 20-1 was poorer than G.1. in yield. Kendrapura dubara was equal to G.1. in yield as well as thrips susceptibility. In the trial of cultures in family block, the selection G.1. 193-4 was most productive. None of the varieties or strains was completely resistant to thrips. Four hundred and twelve cultures were under replicated row-yield trials during the season. Only six of them recorded significantly higher yields than the standard. Three of these were reselections from Kendrapura dubara and three from G.1.

One hundred and fifty-four types obtained from different parts both from India and abroad were grown and studied in observation plots. Fifty of these are from United States of America. Except varieties from Sabour (Bihar) which were relatively free, all the others were susceptible to thrips attack.

One hundred and fifty-three crossed pods were obtained from 1,485 crosses involving 52 combinations. Hybrids between G.I. and Nallapadu were outstanding in retention of bright red colour of pods for two months. The F.₁s. raised, in the progeny of the cross between G.I. and culture '2150' were more homogeneous than the progeny of other crosses.

Study of the internal structures of leaves of different varieties did not reveal any striking differences.

Estimates by taste for pungency were not helpful in bringing out differences within the 'Pungent' group. In regard to localization of pungency within the pod, it was seen that placenta and the base of the placenta were the 'pungent' parts of the pods.

The trial of insecticides for controlling thrips damage for a second season confirmed the previous findings, viz., advantage of B.H.C. 50 per cent (P. 520 spray) in checking deterioration of the crop condition and enhancing the yield.

The results of spacing trials combined with number of seedlings per hole showed that planting singles at 6 inches by 22 inches was as good as planting in bunches at 22 inches by 22 inches but it was economical to plant singles at 6 inches by 22 inches.

8. BOTANY—SYSTEMATIC AND BOTANIC GARDENS.

A. Systematic Botany.

1. *Systematic work*.—During the year over 1,742 specimen were identified for Government and private institutions and individuals as well. About 487 specimens were added to the herbarium collections.

2. *Botanical survey*.—Botanical survey in Ramanathapuram and Tirunelveli districts, back waters areas in East and West Coast districts and Coimbatore were completed.

3. *Taxonomic Research*.—Taxonomic studies in *Turnera*, *Jatropha* and *Cenchrus ciliaris* var *bangalorensis* were pursued.

4. *General*.—Studies in the floral morphology of the jack phyllotaxy of *Thevetia*, poly and schizocotely in dicotyledous, normal and abnormal coconuts, were conducted.

The Handbook on South Indian Weeds was revised and sent for Publication.

5. *Economic Botany*.—Forage plants such as blon-buffel (*Cenchrus ciliaris* var *bangalorensis*) water grass (*Brachiaria mutica*) *Indigofera endecaphylla*, *desmodium canum* and limouse, kudzu, thornless minosa, velvet beans, a number of green manure plants as *Crotalaria*s, *sesbanias* and medicinal plants were studied.

Essential oil yielding grasses were studied and a manurial trial on vettiver (*Vetiveria zizanioides*) was in progress at Pattambi and Wynaad for improving the yield and quality of roots.

Studies in the germination of seeds and supply of seeds of fodder forage and other economic plants was done.

B. Botanic gardens.

1. *Ootacamund*.—Besides maintaining the nursery and gardens, several ornamental flower, vegetable and other economic plants were introduced for trial. Studies for a growth flowering habit of annuals, shrubs and trees were made; propagation trials with *Magnolia*, *Quercus* and *Wistaria* were in progress. Studies on the dormancy of seeds of *Eucalyptus*, *Cupressus*, oil extraction from Lemon grass, *Pelargonium* and *Ocimum camphora*, and wild flora of Nilgiris were pursued. A revenue of over Rs. 8,415 was realized by sale of cut flowers, seeds and seedlings and plants.

2. *Sim's Park, Coonoor*.—Studies on the growth and flowering habits of annuals, shrubs and trees were pursued. Taxonomic study of *Eucalyptus* and roses was taken up for basis for classification and identification. New flower, vegetable, medicinal and other economic plants were added to the collections. Propagation studies indicate that *Camelia japonica* could be propagated easily by leaf cuttings. A revenue of Rs. 5,969 was realized by sale of cut flowers, seeds, seedlings and plants.

3. *Coimbatore*.—Besides providing facilities for teaching for B.Sc. (Ag.) and Horticulture diploma course students in ornamental gardening, studies in propagation of flower plants were pursued. The following seeds and plants were distributed to the public:—

Pot plants (Numbers)	..	..	1,788	Avenue trees seeds
				14 lb. 6 oz.
Plant cuttings (Numbers)	..	..	586	
Flower seedlings (Numbers)	..	..	984	
Canna bulb (Numbers)	..	..	64	

4. *Bapatla*.—The garden was extended and live hedges raised. A large number of ornamental vegetable, medicinal and economic plants were raised. Vegetables were raised for supply to the students' hostel.

9. CYTOGENETICS.

Fundamental studies on Cytogenetics of rice, millets, fruits and other horticultural plants were pursued. In rice research in wild species and geographic races, induction of genetics chromosomal variations, hybridization between varieties were done. Inheritance of characters was also studied. A mutant from a South American variety was picked out. The "acenaph-thene" induced mutant of Co. 13 was under yield trial. A scheme for study of transgressive segregation by crossing two saline resistant varieties SR. 26-B and Piri-Tellathokavadlu and two non-lodging varieties, was started. Piri-Tellathokavadlu resistance was tested in the progenies of inter-varietal crosses between varieties introduced from different countries. In millets special attention was paid to the "autotetraploid" *Pennisetum typhoides* and back crosses of the "Allo tetraploid"

pennesetum inter specific hybrid. Hybridization between cultivated grain sorghums and Johnson grass (*Sorghum halepense*) was done. Trials with Colehicine to induce polyploidy in grain sorghum Co. 5 was attempted. In setaria hybridization of the diploid form *S. Verticillata* with *S. italica*, *S. intermedia* and *S. Pallidifucca* was done.

Three post-graduate students were trained, of whom two were declared qualified for M.Sc. degree and the other is continuing his studies.

10. AGRICULTURAL ENGINEERING RESEARCH.

Research—Mechanized farm operations.—The object is to study the cost and economics of mechanized farm operations. At the Millets Breeding Station, the cost of working a 6 feet 'guntaka' by a tractor for uprooting weeds came to Rs. 2-3-3 per acre. Sowing with oliver $\frac{1}{2}$ unit seed drill behind a Massey Harris 20K tractor came to Rs. 2-6-6 per acre for cholam. The outturn per day of 8 hours was 12.6 acres.

At the Agricultural Research Station, Tindivanam, mechanical sowing and harvest trials with tractor-drawn machinery was in progress.

Howard 'rotovator' was found to work well in wet lands with water standing 10 inches—12 inches deep. Puddling up to 6—8 inches deep was possible.

Use of indigenous implements with tractors.—Guntaka (blade harrow) hitched to a tractor was tried for harvesting groundnuts at Tindivanam and was found to work satisfactorily. The 'country plough' hitched to a tractor was also found to work well. A seed drill hitched to a tractor was tried for sowing groundnuts and was found to work satisfactorily.

Testing of implements and machinery.—John Deer Peanut Planter-Harvester, John Deer grain drill, self-propelled Massey Harris combine Harvester, Double discplough, Chifford garden tractor, deep well pumps and several tractor drawn implements from foreign countries were given exhaustive trials.

Dynamometer recordings on tractor and bullock drawn implements and readings on variations of water table in Coimbatore with Mansfield water finder were noted.

Manufacture of spare parts of modern implements in groups and stages was successfully attempted.

Training in Agricultural Engineering.—Six Agricultural graduates were given training for one year in Agricultural Engineering at the Research Engineer workshop. Training was also given to the two batches of trainees in tractor and oil-engine operations. Three licenciates in Mechanical Engineering were given training for a period of six months.

11. AGRO-INDUSTRIES.

(1) *The Malt Factory, Coimbatore.*

The Government Malt Factory worked on a profit earning basis for the second-year in succession during 1951-52 and the Government were pleased to grant bonus to the labourers in the factory for the first time in view of the profits made by the factory.

2. Production and sale of "Malt Extract with Shark Liver Oil" continued to be the main item of work in the factory. Production during the year was the maximum (32,186 lb.) ever obtained since the inception of the factory and exceeded the estimated target.

3. There was a progressive increase in the off-take of the product by the Medical Institutions.

4. Clinical trials conducted with the product at the Government Stanley Hospital, Madras, confirmed the previous findings that the product is an excellent tonic for growing children and convalescents.

5. A decrease in sale price was effected during the year to popularize the product among the public as suggested by the private selling agents. The off-take by agents however continued to be far below expectations.

6. Wide publicity about the product was given by issuing circular letters displaying in exhibitions advertising in Commercial Directories and by issuing free samples to other State Governments.

7. Investigations carried out at the factory indicate that—

(a) couching of cholam seeds on cement floor is as good as couching the seeds in trays;

(b) Vanilla essence as a flavouring agent for Malt Extract with Shark Liver oil is more suitable and economical than a mixture of Cinnamon oil and Vanillin crystals; and

(c) ragi is in no way cheaper than cholam in the manufacture of Malt Extract.

Guaranteed Vitamin 'A' content in the final product was maintained in all the batches released for sale.

8. The factory continued to train "Food Technology" students.

(2) *Fruit and Vegetable Canning and Preservation.*

Research.—Efforts were made to modify the technique of processing fruit and vegetables with a view to obtain canned products of better organoleptic qualities and improved texture. Simplification of processing procedure was also attempted through the use of a latest type of glass container known as 'Clampon' jar and through the regulation of the PH value of the canned material and/or its covering syrup or brine. Results of the use of these improved technique were particularly encouraging in the case of palmyra kernels (Nungu), musmelon pulp and a number of foreign and indigenous vegetables. Country pears and "Badaga Beans"

(from Nilgiris) canned when immature, were found to be satisfactory on "cut-out" examination.

2. *Fruit juices, squashes and cordials*.—A pomegranate cordial of high quality was produced while a cordial from passion fruit juice was attempted with only limited success. A multivitamin fruit juice cocktail (sweetened) with and without added malt extract was prepared with satisfactory result. The cocktail was made up of five different fruit juices, each rich in one or more of the important vitamins—A, B, C and G. Malted fruit beverages, prepared from orange, pineapple and grape fruits gave very useful results. Preliminary carbonation trials were successful in the case of Jaman, cashew-apple and "Passion fruit-lemon" beverages. A satisfactory mixed squash was obtained by blending passion fruit and lemon juices.

3. *Jams, jellies, marmalades, etc.*—Musk melon jam with shredded lemon, marmalade from a kind of bitter orange blended suitably with sweet orange, guava-cheese, sapota paste and mixed jams of Banana-pear and Banana-*Garcinia tinctoria* were prepared with satisfactory results. A high-class jelly was produced from waste material like the sepals of the 'roselle'. Explanatory trials on making fig jelly, ber jelly, banana cheese and breadfruit jam produced varying degrees of success.

4. *Other products*.—Candies from *Garcinia tinctoria* fruit and grapefruit peel were produced quite successfully.

5. *Administration of Fruit Products Order*.—This was in charge of the department till 31st December 1951 and was taken over by the Government of India with effect from 1st January 1952. Thirteen new licences were granted, 84 inspections of firms and premises were carried out and 67 market samples were analysed till end of December 1951.

6. *Training*.—One candidate from the Kozhikode Polytechnique in Food Technology was trained for the three months certificate course in Fruit Canning and Preservation conducted at the Fruit Canning and Preservation Laboratory, Kodur.

7. The erection of the pilot plant for canning and fruit preservation was in progress. The canning and ancillary units and fly-proofing arrangements have yet to be completed. The machinery from the United Kingdom is expected shortly.

12. THE AGRICULTURAL RESEARCH STATIONS.

The Agricultural Research Station, Aduthurai (Tanjore district.)

I. The results achieved in research during 1951-52.

Paddy—(1) *Intensive cultivation and enhanced paddy production*.—Despite adverse seasonal conditions, namely, defective, rainfall and severe incidence of insect pests, an increased paddy production was attained on this station due mainly to intensive

manuring and growing of high-yielding paddy strains. High yields on the farm especially of *thaladi* (second crop) served as a very useful demonstration to the numerous interested mirasdars who visited this farm. The *kuruvai*, *samba* and *thaladi* crops on the station registered average acre yields of 3,000 lb., 3,500 lb. and 3,000 lb., respectively, whereas the corresponding estimated average yields of these crops in the whole of Tanjore delta were 2,000 lb. for *kuruvai* and *samba* and 1,200 lb. for *thaladi*. The 'blast' resistant hybrid strain, viz., Co. 25 gained still further popularity in this delta due to its performance over all other prevailing varieties in respect of its response to intensive manuring.

(2) *Release of high-yielding new strains*.—Two promising cultures, viz., 10,600, a pure line selection from Poonsamba, extensively cultivated in Tiruchirappalli district under rain-fed tanks, 1560-a 'blast' resistant hybrid culture of superior commercial rice quality, completed their final yield tests satisfactorily on this station as well as in ryots fields in typical centres and it was decided to christen them as ADT. 24 and ADT. 25, respectively, and release them for general distribution to the ryots.

(3) *Hybridization for crop improvement*.—Considerable advance was made in this line of work designed to solve certain important special problems which hamper paddy production. Soil salinity and inundation in particular areas, lack of seed dormancy of all the *kuruvai* (first crop) varieties which result in rapid deterioration of the seed at harvest in rainy weather and susceptibility to premature lodging of most of the prevailing varieties which render intensive manuring rather risky or some of these special problems. The only method to solve these problems effectively is to breed suitable strains combining desired characters by hybridization. A number of crosses between selected parental types was effected for the above purpose and a number of F-1, F-2 and F-3 progenies of crosses previously effected was critically studied and desirable plants individually selected for further progeny tests.

(4) *Cultivation of cotton in rice fallows*.—This important item of work was expanded during the season under review and a fairly large area of nearly 20 acres was put under cotton. The short duration variety Punjab 216-F was found to be eminently suitable for the purpose. Despite many unfavourable seasonal conditions an average yield of 645 lb. of kapas per acre, was obtained over the entire area. The trials on the farm proved beyond any doubt that if lift irrigation facilities are available cotton crop could be successfully cultivated in the rice fallows of Tanjore Delta with a very decent margin of profit. The erstwhile apprehension among Tanjore ryots that the cotton crop might adversely affect the succeeding paddy crop was also thoroughly dispelled by the results obtained on this farm. It was also clearly demonstrated that the cotton crop residue makes as good a green manure as any other green manures or green leaf manures. The abovementioned successful demonstration on this station particularly during the year under review instilled confidence in several interested mirasdars of this district to

undertake the cultivation of this money crop in their rice fallows in future.

(5) *Green-manure crops*.—The knotty problem of providing green manures for second crop (thaladi) in this vast delta could be effectively solved by growing *Sesbania speciosa* on the field margins of the first crop ('kuruvai'). It was most convincingly demonstrated on this station by adopting this practice extensively on the entire double-crop area of about 30 acres. An average of 5,000 lb. of green leaf per acre was obtained by growing *Sesbania speciosa* in thin manner and this was obviously the single factor which chiefly accounted for the high production of thaladi crop on this station in contrast to the deplorably low average yield of this crop in this delta as a whole due to soil depletion. The average yield of thaladi during the last two seasons when *Sesbania speciosa* raised as a marginal crop in the 'kuruvai' was applied, was over 3,250 lb. to an acre as against the average of about 2,000 lb. during the previous five seasons. This novel and practicable method of growing *Sesbania speciosa* simultaneously with the first crop and incorporating it for the succeeding thaladi as evolved on this station and adopted as a routine method over the entire double-crop area, has strongly appealed to the public in general and is sure to be copied on a large scale in the ensuing season.

(6) *Additional lift irrigation facilities*.—The installation of a 6 inches bore-well and a 4 inches and 3 inches filter point tube wells and the receipt of electric energy to work motor pumpsets, materialized during the year under review. The abovementioned additional irrigation facilities proved to be of immense help for a large-scale cultivation of cotton and vegetable crops in the rice fallows, besides being useful for raising of early 'kuruvai' paddy nurseries far in advance of canal water-supply.

II. Programme of work for 1952-53.

1. *Enhanced paddy production*.—A higher target of seed production than hitherto, was fixed for 1952-53 mainly by increasing the area under double crop by 6.20 acres. An additional quantity of not less than 15,000 lb. of 'nucleus' paddy seed is thus expected to be produced.

2. *Evolution of new strains*.—Promising cultures of three important rain-fed varieties, viz., *Kattavellai*, *Kodavellai* and *Kaivarisamba* of Arantangi taluk will undergo the final yield tests on this station and will be ready for "district trial" before being released as improved strains for general distribution to the ryots.

3. *Hybridization for crop improvement*.—This long-term programme of work with the specific objects as mentioned earlier will be vigorously pursued. Fresh crosses will be effected if suitable new parental types could be obtained from elsewhere. The existing cross-progenies will be carefully studied.

4. *Cotton cultivation in rice fallows*.—Varietal, cultural and manurial trials will be continued in collaboration with the Cotton Specialist. The maximum possible area, about 25 acres of rice fallow, will be put under bulk crop in order to enhance the revenue of the station and also to demonstrate to the ryots the practicability of cultivating this commercial crop during the off-season with profit.

5. *Green manures*.—The possibility of providing green manure for thaladi, by growing *Sesbania Speciosa* in the field margins of 'kuruvai' and thereby considerably enhancing the present low level of production in an extensive area of about three lakhs of acres in the delta, will continue to be demonstrated by adopting this practice as a routine measure on the entire double-crop area of this station.

6. *Additional lift irrigation facilities*.—Two more bore-wells in two different blocks if provided will completely solve the lift irrigation problem on this farm and thus enable a larger area to be cultivated under cotton and vegetables in summer besides assuring adequate water-supply for raising of 'kuruvai' nurseries. This work will be taken up early during 1952-53 season.

7. *Plant protection*.—Paddy stem rot (*Sclerotium oryzae*) hitherto considered to be only a minor fungus disease in our State, has been assuming serious proportions in recent times in the whole of Tanjore Delta, causing serious damage to 'kuruvai' and 'ottadan' crops. A trial to pick out varieties resistant to this disease will be conducted in collaboration with the Government Mycologist.

The Central Banana Research Station, Aduthurai (Tanjore district).

I. Results achieved in research during 1951-52.

Banana variety collection.—Twenty-one banana varieties were added during the year making the total number of varieties under trial to 153. The mean period from planting to harvest ranges from 280 to 548 days under the perennial system of cultivation as practised at Aduthurai.

Hybridization.—*Musa Chilicarpa*, a new introduction from Philippines, will be used in breeding work. Preliminary work in hybridization with *Musa Coccinea* dwarf species as male yielded two hybrids of Monthan, the leading cooking variety.

Mutants.—Two mutants isolated for study during the year are—

- (1) Medium tall type of the Australian variety, Monsmarie.
- (2) Rasthali plant with fruits of high grade.

Propagation and plantation practices.—(1) *Selection of suckers*.—This trial was laid out on 21st November 1951 to compare which of the two type of suckers, namely, 'sword' and 'broad leaved', forms the more efficient planting material. The

height girth and leaf counts recorded in June 1952 were analysed. Three months old 'Sword' of the Poovan variety had better height, girth and leaf counts over 'broad leaved' suckers of the same variety and same age.

(2) *Method of propagation.*—This trial was initiated on 6th July 1952 to find out if bits and corms could provide quantitatively available material for raising new plantations. The trial is in progress. It is, however, noted that the suckers raised from the 'mother' corn of Monthan variety were the first to complete flowering and these have so far given the highest average bunch weight of 25 lb. 12 oz.

(3) *Season of planting.*—The monthly planting trials from February 1951 to November 1951 indicate that suckers of the Poovan variety planted during the months of June, September and October and of the Monthan variety planted during the months of June, July and September have better height and girth measurements.

(4) *Plantation practices.*—*Ratooning, mattedking, spacing, cultural trials were in progress.*

(5) *Manurial trial in wet lands.*—The trial with eight different treatments was initiated in March 1951 and is in progress. The progress of flowering and yield was tabulated. So far 231 bunches out of 512 have been harvested. The treatment, namely, ammonium sulphate to supply $\frac{1}{4}$ lb. nitrogen plus cattle manure to supply $\frac{1}{4}$ lb. nitrogen per plant indicate early flowering and fruiting and increase in bunch weight.

(6) *Desuckering trial.*—This trial was started in April 1950 and is in progress. The total weight of bunches from the inception of the trial up to 30th June 1952 under the different treatments indicate that both in total bunch weight as well as average bunch weight, the treatment wherein all suckers are removed except the one that emerges after the parent plant has flowered, is found leading over the rest.

(7) *Other crops.*—Paddy and cotton as rotational crops were raised.

II. Programme of work for 1952-53.

The technical programme of work prepared under the Indian Council of Agricultural Research Scheme will be continued.

The Rice Research Station, Ambasamudram (Tirunelveli district).

I. Results achieved in research during 1951-52.

The Rice Research Station, Ambasamudram, produced 18 tons of paddy seeds of various varieties, 32 lb. of vegetable seeds and 393 lb. of seeds of plants and shrubs yielding green leaf. Besides 122,335 seedlings and cuttings of green leaf yielding plants were distributed through the Agricultural Demonstrators of the Division.

Paddy.—The hybrids 3798 and 3800 from Coimbatore were compared with ASD. 1 and ASD 7. No significant results were obtained.

Yield trials with cross progenies of ASD. 1 and local short-duration varieties were laid out with twelve selections and compared with ASD. 1 as standard. Six of the selections were on par with ASD. 1. This year's as well as previous years' were not in favour of continuing the experiments.

No valid conclusions could be drawn with the trial of fourteen selections of the crops progenies of ASD. 1 and Vedddividangan and it was therefore decided to repeat the trial for one more season.

Pure line selection work on Seenganni and Maikuruvai was continued and 97 and 47 selections respectively will be carried over to next year. About 311 selections from Banku will also be carried over to next year.

Trials with Kolvalalai selections were concluded and the strain under the name of ASD. 10 will be released shortly.

Under varietal trials Co. 25 once again did better than Co. 26, Co. 19, Co. 12, ASD. 6 and ASD. 5.

Liming experiments were concluded and it was found that addition of lime at 1,000 lb. to 1,500 lb. per acre had no effect on the paddy soils of the Agricultural Research Station, Ambasamudram.

Application of fused phosphate and super-phosphate on phosphoric acid basis did not show any difference. The experiments laid out to observe the effect of super-phosphate and ammonium sulphate when applied alone along with and without basal dressing of green leaf, confirmed the results obtained in the previous seasons, namely, that (i) super-phosphate by itself is unable to make its presence felt, (ii) super-phosphate fared better with green leaf or ammonium sulphate and (iii) super-phosphate green leaf combination is the best.

The indications from the six treatments under observation to test the efficacy of the local practice of giving repeated dry ploughings to paddy fields during April and May, were in favour of the local practice.

Miscellaneous.—The Sindhi Breeding Bull at the Rice Research Station performed 75 services during the year under report.

Seeds distributed—

Paddy seeds of all improved strains	.. .. .	40,700 lb.
Green manure seeds	.. .. .	344 lb.
Vegetable seeds	.. .. .	30 lb.
Sebania seedlings	.. .. .	120,000 (numbers).

II. Programme of work for 1952-53 as approved will be followed.

The Sugarcane Research Station, Anakapalle (Visakhapatnam district).

I. Results achieved in research during 1951-52.

Sugarcane.—In the varietal trials Co. 719 was found to retain juice quality late in the season. Variety Co. 419 though heavy yielder, does not retain quality beyond April and the selection of a variety to retain quality in April/May is of practical importance, particularly in factory areas.

Application of nitrogenous manures in organic or inorganic form did not affect yield or quality of juice though in certain tracts higher proportion of inorganic form resulted in higher cane yields, while higher proportion of organic form resulted in better juice quality. The effect of applying organic and inorganic forms of nitrogen continuously year after year in the same field is now under study. Application of manure at planting resulted in release of nitrogen at a stage when the crop was not in a fit condition to utilize it to the maximum. Application of the first dose of the fertilizer, 45 days after planting has been found to be best. Study of manure in relation to water requirement of sugarcane revealed an important indication that inorganic form of nitrogen should not be preferred under low soil moisture conditions. While it is widely known that under conditions of heavy manuring more water is required for the comparative merits of the two forms of nitrogen in relation to availability of water have not so far been studied. Indications, however, are that organic form of nitrogen has to be preferred under low soil moisture conditions. Under such conditions the inorganic form gives lower yields. In relation to soil type, pot culture experiments revealed that when water is plentiful, both the soil types, light and heavy, record high yields; under reduced water supply, the heavier soil types are not efficient in crop production. The general indications are that organic form of manure may be preferable under heavy soil types with limited water supply. The experiments are still in progress. It was again confirmed that pig-dung is a better starter for composting cane trash. The weedicide 2-4D combined with diesel oil emulsion was found effective against dicots and nut-grass but it is too costly. The effectiveness of the weedicide is increased by spraying at the time of emergence of weeds, i.e., before the first pair of leaves are formed.

Propping with bamboos is an age-long but costly operation practised in Visakhapatnam and Godavari districts. Trials at Anakapalle and at the Sugarcane Liaison Farm, Samalkot, reveal that combined with planting in deep trenches the "trash twist" method of propping is efficient for a crop yielding 45 tons of cane. Cost of production of cane by this method of propping worked out to Rs. 6 per ton. This method of propping is useful in upland tracts while its merits under delta are yet to be assessed. Planting of "rayugans" (sprouted buds) in deep trenches one metre apart

with a spacing of half metre between the buds to the row, resulted in good growth of uniform canes in a clump. Combining this system of planting with the "short crop" system new varieties can be multiplied 600 to 900 times within a year as against the present rate of about 100 times obtained by short cropping alone. Studies in liming indicate that PH 6.4 may be the optimum for immature and mature juices and liming to higher PH did not improve the setting quality of the deteriorated juice. Use of super in combination with lime proved useful under certain conditions and the wider applicability of the same is under further investigation.

Studies in smut were continued to assess the loss in yield and the mode of carry over of disease to the ratoon crop. Apart from the death of shoots due to smut, the apparently normal ones were seen to be reduced in growth. Loss due to such defects may go up to thirty-nine per cent. There are indications to show that the smut is carried over by primary infection of buds about ground level while the buds lower down may be comparatively less infected. Shaving of stubbles for ratooning the crop seems to reduce infestation and this is under further investigation. Varieties Co. 57 and Co. 449 are again confirmed to be less susceptible to smut than the varieties Co. 419 and Co. 475. In the case of early shoot borer, studies indicate that the loss in yield may go as high as over 29 per cent and that the borer can be effectively controlled by spraying 0.32 per cent D.D.T.

Other crops.—In paddy it was found that culture No. 3948 of Gumasari was outstanding. For the late planting season long-duration varieties Co. 25 and Co. 26 were found to be promising.

Sesbania Speciosa was found to give very good yield of green manure 37,000 lb. per acre when raised during the hot weather period with four irrigations.

II. Programme of work for 1952-53.

Recording the performance of varieties in the study plots and in yield trials will be continued. Performance of varieties under conditions of water-logging will be studied with two varieties, viz., Co. 630 and Co. 419. The effect of continuous application of ammonium sulphate will be under investigation in the permanent manurial experiment. A new experiment to test the efficacy of chilean nitrate as a source of nitrogenous manure has been laid out from 1952-53 season. Other miscellaneous studies will include propagation of cane by the Rayungan method, planting of cane in pits and jaggery storage. In the division of chemistry, studies on the nitrogen nutrition of cane and foliar diagnosis will be continued, besides investigations like the study of composition of cane juice and its effect on quality of jaggery, use of clarificants like lime and super in jaggery in making and composting of cane trash. In physiology, water requirements of sugarcane crop in relation to

the form of manure will be studied. Pot culture experiments to study the manurial requirements of Co. 419 with reference to loamy and clayey soils and their moisture contents will be continued. Other miscellaneous studies include, studies on the propping of cane, effect of weedicides and maturity of cane. In the mycology division, the varietal resistance to smut and red-rot will be continued. Mode of carry over of smut, and loss due to its incidence will also be observed. In the entomology division an experiment on the chemical control of borers will be laid out. Other studies will include the effect of mealy bugs on the germination of cane setts, loss due to the early shoot borer and control measures of minor pests.

In paddy, yield trials with promising cultures and manurial experiments suggested by Government Agricultural Chemist will be conducted. Seed multiplication of important strains of ragi, ganti cumbu and jonna will be undertaken. In addition to propagation of important fruit plants like mango, jack and guava hybridization work in brinjals and sapota will be taken up.

The Rice Research Station, Buchireddipalem (Nellore district).

I. Results achieved in research during 1951-52.

Crop improvement—(a) Paddy—Pure Line Selection.—Five cultures in Molakolukulu, viz., 42, 257, 151, BCP. 1-176 and BCP. 1-76 six cultures in Sannavadlu, viz., 1662, 1647, 1652, 1634, 1639 and 1663 and four cultures 1480, 1455, 1485 and 1467 in Masipishanam were found promising. Pishanam 1439 was found to be no better than BCP. 4. Observations in Iswarakora selections could not be made as the crop was badly affected by unprecedented drought.

(b) **Hybridization.**—(i) The results were not significant in the trial of two cultures of kambansamba cross progenies. But 6993/4 gave better yield than 6994-1. One hundred and fifty-eight single plants were selected in the secondary selections in Kambansamba cross progenies.

(ii) In the progenies of cross between BCP. 2 × Molakolukulu 1834 for semi-wet conditions, 32 single-plant selections were made for further study.

(iii) One hundred and eighty-nine apparently blast-free selections were made in the F.3 progenies of crosses with Co. 4. Seeds were collected from the F.1 of BCP. 1 × Co. 4.

(iv) No results could be obtained in the yield trial with hybrid progenies of Ishwarikora and Pishanam 1283, as the crop was a failure due to drought.

Blast study.—As the incidence of blast was negligible during the year no useful observations could be made in the blast study experiment.

Green manures.—Five hundred and thirty-six pounds of *Sesbania speciosa* seeds were collected from the plants planted along the field and channel bunds.

Eight pounds of *Gliricidia* seeds were collected from the old plants standing on the bunds.

Seed distribution.—

Name of the improved seed.	Quantity distributed in lb.
1 Paddy seeds	2,327
2 Green manure seeds	507
3 Vegetables	12-14 oz.
4 Fodder grass slips	15,750 (numbers)

II. Programme of work for 1952-53.

I. Improvement of local varieties of paddy—(1) *Pure line selections of (a) Molakolukulu and secondary selections in BCP. 1, (b) Sanna vadlu and (c) Masipishanam varieties will be continued.*

(2) *The single-plant selections in Iswarikora will be under study.*

(3) *The promising cultures in short-duration varieties grown in the second crop season will be maintained.*

II. Hybridization.—*Evolution of strains resistant to blast, drought and salinity will be continued.*

III. Introduction.—*Co. 25 and Co. 26 will be compared with BCP. 1 and BCP. 2.*

IV. Study of blast.—(a) *Study of incidence of blast under (i) different irrigational treatments, (ii) under different systems of planting, viz., by planting seedlings raised under wet and semi-dry conditions, (iii) under different doses of manuring with ammonium sulphate and (iv) under manuring with lime, superphosphate and heavy doses of green leaf.*

(b) *Trial of strains and varieties sent by the Government Mycologist will be continued.*

V. Manurial experiments—Phosphate manurial trials.—*Experiment with bonemeal and superphosphate at three levels of P₂O₅—0 lb., 30 lb. and 45 lb. will be continued for the second year.*

VI. Cultural experiments.—*An experiment with treatments, namely, (a) dry ploughing and planting on receipt of water, (b) dry ploughing and applying green leaf and planting, (c) growing green manure, puddling and planting and (d) keeping fallow, puddling and planting, will be laid out.*

Others.—*Collection of data for stemborer attack on bulk crops will be continued.*

Other crops.—*Pulses, cotton and vegetables will be grown in rice fallows.*

The Pomological Station, Coonoor (The Nilgiris).

I. Results achieved in research during 1951-52.

The growth and yield performance of Rome Beauty apple on Merton 779 and 778 rootstocks was the best among the five rootstocks under trial. Grafts of six new apple varieties have been propagated from scion material, obtained from New Zealand. The oil spray trials to hasten blossoming and promote yields were extended by employing Sandolin 'A', a proprietary product, besides linseed oil already successfully in use. The new product hastened flowering in the variety "Winterstein" by 26 days while the linseed oil advanced the flowering only by eight days over the untreated trees. In terms of cropping, the treatments in the order mentioned, gave mean tree yields of 590, 325 and 295 fruits respectively. A progressive accentuation of incompatibility between scions of plum varieties Czar and Gaviota on plum seedling rootstocks was noticed in the rootstock trials in progress. The anticipation, therefore, that these rootstocks may prove more suitable than the common peach seedling has not been realized. Propagation of persimmon by inarching and whip-grafting on *Diospyros Lotus* seedling rootstocks met with success.

Yellow coloured passion fruit variety introduced from Ceylon and Seville lemon from the plains both proved promising for cultivation on the higher elevations at Coonoor. In strawberry and pyrethrum, the multiplication of the clonal progenies of the high-yielding 'lines' has been taken on hand for distribution of planting material to the growers.

II. Annual programme of work for 1952-53.

Further work to extend the trials on hand towards enriching the existing collections with new and improved varieties and types will be undertaken. The trials to increase crop yields through improved cultural practices such as pruning and training, irrigation, use of hardy and disease-resistant rootstocks, top-working of suitable pollenisers on self-infertile plum trees, isolation of high yielding strains and individual trees of merit will all be continued on approved lines to obtain conclusive results.

The Sim's Park, Coonoor (The Nilgiris).

I. Results achieved in research during 1952.

Systematic studies on the growth, flowering and performance of annual trees and shrubs were continued. The data collected on annuals gave indications for the broader classification of these annuals into groups, on the basis of their duration and on the length of the blooming periods, this information is of much value to be recommended to the public. The shrubs and trees were classified according to their flowering periods.

Taxonomic studies were continued on the Rose varieties and *Eucalyptus* species. So far 55 varieties of Roses and 32 species of

Eucalyptus had been described. These data have enabled the preliminary identification of the various roses by the nature of thorns, number of leaflets and colour of the emerging leaves and of *Eucalyptus* by the nature of the bark peeling, shape of the juvenile leaves etc. Studies on the dormancy of seeds of ornamental trees such as *Eucalyptus Citriodora*, *E. Ficifolia* and of *Jacaranda Mimosaeifolia* were pursued and the observations made have been found to be useful in determining the period of viability. Attempts were also made to propagate *Araucaria Bidwillii* on ornamental conifer, by cuttings.

Plant introductions were continued, successful among the introduction in ornamental and economic plants were five new varieties of standard roses, *Digitalis Lanata*, fifteen kinds of medicinal plants, white uerium, Malta and Seville lemons and Roselle and among bulbs and annuals were *Caladiums* and *Celome*, *didiscus lobella*, variegated petunia and *Amaranthus Tricolour*. Studies were also made on the colour effect of grouping of annuals and shrubberies at the Park.

II. Programme of work for 1952-53.

Besides keeping up the park as a pleasure resort for the public, studies in the taxonomy of roses and *Eucalyptus* will be continued. Studies in dormancy of seeds, introduction of new ornamental and economic plants and propagation of ornamental plants will be continued.

The Central Farm, Coimbatore (Coimbatore district).

I. Results achieved in research during the year 1951-52.

(i) *Compost experiments*.—In the experiment conducted on ragi, the yields of 'Nightsoil Compost' and 'Farm Yard Manure' plots were equal.

In the experiments conducted on paddy, the results indicate that 'Nightsoil Compost' was better than 'Farm Yard Manure'. The results of II series however, show that 'Farm Yard Manure' plots are better than 'Nightsoil Compost'.

(ii) *Irrigation experiments on ragi*.—(a) *Grain yield*.—(1) Plots irrigated at intervals of 10 days were better than 15 and 20 days interval plots.

(2) Irrigation given at 3 inches depth was superior to 2 inches depth.

(b) *Straw yield*.—(1) There was no difference in plots receiving irrigation at intervals of 10 and 15 days.

(2) The yield in plots receiving 3 inches was better than 2 inches plot.

(iii) *Comparative trials of fodder grasses*.—The total yield of the first ten cuttings was subjected to statistical analysis. Results indicate that Guinea grass is superior to Kolukattai grass, (2) "Cumbu x Napier grass" and water grass are on par but

superior to Guinea grass and (3) Napier grass is superior to all the other grasses.

II. Annual programme of work for 1952-53.

- (i) Irrigation experiments on ragi will be continued.
- (ii) *Compost experiments*.—The experiment was originally intended to run for four years and the fourth year has been just completed. It will be discontinued.
- (iii) *Comparative trials of fodder grasses*.—The fifteenth cutting has just been completed. The result of first ten cuttings have already been reviewed. The yield of fifteen cuttings will be reviewed and further continuance will be decided.
- (iv) *Fertiliser placement trials on paddy (Fundamental Research)*.—This experiment will be started this year only. The object is to study the response of paddy crop to the placement of ammonium sulphate and superphosphate along with different doses of cattle manure.
- (v) Facilities will be provided for training of B.Sc. (Ag.) students in practical agriculture.
- (vi) Fodder crops required for the College Dairy will be raised and seeds of important strains of crops will be multiplied and supplied for raising 'Primary' seed farms.

The Sugarcane Research Station, Gudiyattam (North Arcot district).

I. The results achieved on research during 1950-51.

Sugarcane.—In the varietal study plots 112 varieties were under study and based on their juice quality and field habit the following varieties were found to be promising: Co.619, Co.740, Co.747, Co.672, Co.732, Co.779, Co.682, Co.805, Co.677, Co.678 and Co.771. In the yield trial with early maturing varieties, no other variety was found to be better than the standard varieties, Co. 449 and Co.419. Among the late varieties, Co.467, Co.449 and Co. 475 yielded significantly better than Co.419, and were on par amongst themselves. In the experiment to study the economics of taking a plant crop followed by ratoon in comparison with growing a long duration crop of twenty months, it was found that there was very severe damage in the May planted crop by way of lodging, breakage and rodent attack. The March plant crop and its ratoon gave an yield of 59.21 tons as against 37.25 tons from a long duration May planted crop. It can be concluded that a plant crop and its ratoon yield almost double that of the long duration crop of 20 months termed 'Adasali' during practically the same period. It is not practicable to keep the long duration crop on the field without damage.

In paddy G.E.B. 24, MTU. 19, ASD.5, Co.25 and Co.26 were grown during the samba season from July to February. An average yield of 2,592 lb. from G.E.B. 24 and 1,580 lb. per acre

from A.S.D. 5 were obtained. The new strain MTU. 19 compared with G.E.B. 24 gave an yield of 3,420 lb. as against 3,000 lb. from G.E.B. 24 on acre basis. Paddy Co.25 and Co.26 tried for the first time on the farm gave an yield of 2,070 lb. and 1,874 lb. grain per acre respectively. Paddy MTU. 15 and TKM. 3 were grown during the *Nararai* and *Sivarnarari* seasons. The yield of grain per acre were 2,413 lb. from MTU. 15 and 2,712 lb. from TKM 3. Cotton P.216-F was dibbled in sugarcane fallows along the existing ridges in December 1951 after the harvest. Picking commenced by April and was completed by end of June. An acre yield of 344 lb. kapas was obtained.

Sunn hemp was sown over 9.12 acres for green manuring purposes. *Sesbania* seedlings were planted along all sugarcane field bunds and 177 lb. of seed were collected. The growth of the plants of *Glyricidea Maculata* was good, and 150 lb. of seed were collected.

II. Programme of work for 1952-53.

Study of varieties and yield trial with early maturing varieties will be continued. The time of plauting and harvest experiment will also be continued. Trial of 'Rayungans' as seed material and pit system of planting sugarcane and study of chilean nitrate as a nitrogenous manure will be conducted.

The Agricultural Research Station, Hagari (Bellary district).

I. Result achieved in research during 1951-52.

Agronomic and manurial trials.—The rotation experiment was continued and the previous results were corroborated. Rotation of crops was found much better than no rotation. Raising a pulse crop was found to benefit the succeeding crop more than mere fallowing. The groundnut cake experiment on cotton and jonna and superphosphate experiment on cotton and jonna were repeated. Both groundnut cake and farm yard manure benefited both cotton and jonna under favourable rainfall conditions. Superphosphate did not benefit cotton but induced earliness and increased yield in jonna.

Millets—Jonna.—Nine and 17 selections of *Tella Jonna* isolated from collections made on zonal basis were in yield and preliminary yield trial stages respectively. Though the yield differences were not significant, seven selections from yield trials and six from the preliminary yield trials are promising. Of the seven promising selections under yield tests, two selections J.762 and J.718 recorded highest yield of grain.

Korra.—In *Setaria*, of the 11 cultures under yield trials with strains H.1. and H.2. as controls, selections H.K.289 was significantly superior over both the strains giving an increased grain yield of 11.2 per cent and 42 per cent respectively. Another selection H.K. 336 was on par with H.1. but was superior to H.2. These two selections along with one other selection H.K. 282 that fared well last year, will be issued for district trials. Twelve

promising selections of Korra seven from the black soil area and five from the red soil area, have been isolated for further study. In the rust resistant studies strain H. 1 manifested maximum infection, while 11 out of 51 selections under test recorded infection less than 15 per cent.

Ragi.—In the yield trials, with short duration ragi selections R.1, R.78, AKP.1, AKP.2 and AKP.5 the last three strains gave increased yield ranging from 3.9 to 9.2 per cent over the local selections, but the yield differences were not significant.

Cambodia breeding scheme (unirrigated).—(i) *Bulk yield trials*.—Twenty cultures were tested at both in Hagari and Nandyal with the local "deshi" type as control. The results reveal that (i) at Hagari 'Laxmi' (Glx.CO.2-9-3) is a good yielder and (ii) culture 320 of M.A. 2 origin is promising at both centres. The yield level at Nandyal was low due to adverse seasonal conditions.

(2) *Compact family blocks*.—At Hagari, thirty-one families were tested for purity and estimation of yield, while at Nandyal, twenty-five were sown for study. At both centres, culture 167 is promising, culture 569 and 579 at Hagari and culture 327 and 571 at Nandyal are promising.

(3) *Progeny rows*.—At Hagari, 147 cultures were sown in two sets, while at Nandyal 166 cultures were raised in two sets. After critical study in the field, 106 at Hagari and 62 cultures at Nandyal were harvested for laboratory examination. Data gathered reveal that seven at Hagari and six at Nandyal are promising for carrying to further trial.

(4) *Hybrid studies*.—First generation hybrids 99, sent from Siruguppa were raised at both the centres and suitable single plant selections have been effected, for further test.

(5) *District trials*.—During 1951-52 season, trials with Laxmi M.A.2. and H.A.11 were conducted in districts of Bellary, Anantapur, Kurnool and Cuddapah, with the local cotton as control. Laxmi cotton in general recorded 51 per cent increased yield (kapas) over the control.

(6) *Minor crops—Safflower*.—Twelve cultures and five bulks were under yield trial. Over 200 single plants were secured from the cultivators' fields for further study.

II. Programme of work for 1952-53.

1. *Agronomic and manurial experiments*.—The rotation experiment and the four manurial experiments will be continued as per approved programme.

2. *Crop improvement*.—(i) *Sorghum*.—(1) Evolution of high yielding strains of Jónna from collections made on zonal basis.

(2) (a) Evolution of high yielding strains of Korra.

(b) Rust resistance studies on Korra.

(ii) *Ragi*.—Multiplication of H.1 and Co.1 ragi seeds short duration strain AKP 5 ragi will be issued for district trials.

Two cultures E.C. 4573 and E.C. 4310 received from the Millet Specialist, will be under observation along with H.1.

Setaria.—The 11 cultures under yield trials and 17 cultures under preliminary yield trials will be further tried. In addition, 170 single plants selected for further study will be under observation.

Cultures H.K. 282 and H.K. 289 will be under observation in all the taluks of Bellary and Anantapur districts in cultivators' fields.

Cambodia Breeding Scheme (Unirrigated).—(i) Bulk test of American cottons found productive during last season, will be repeated.

(ii) Trial of fresh material received.

(iii) Study of cultures in family block of progeny rows.

(iv) Trying cultures received from outside centres and F.2. generation in non-replicated observation plots.

(v) Raising second generation crosses sent from Siruguppa and making selections suitable for the centre.

(vi) Trial of promising cultures under rainfed conditions in the ryots' holdings.

Minor crops—Safflower.—The trial of the 12 apparently pure cultures and five bulks will be continued. In addition, 200 new single plant cultures secured from the cultivators' fields during the season will be under study.

Onions.—The six types of onion found to be promising will be compared with local for their yields. Seeds of economic plants and a few indigenous vegetables also will be collected for sale and distribution. Growing of glyricidea on as large a scale as possible and compost other two miscellaneous items will receive attention.

The Kallar and Burhar Fruit Stations (The Nilgiris).

I. Results achieved in research during 1951-52.

In the rootstock trials for the Mandarin orange at Kallar, the growth of the trees, on Pommelo and sweet lime has been the poorest. Though in two of the observation plots, Jamberi rootstock proved to be vigorous, in a third plot with older trees (about seven years in age), signs of gumming, distortion of bud joints and varying degrees of die-back were observed. In jack, six selections of individual trees on merit have been made and their clonal progenies raised. In a monthly marching trial with durian per cent success has been obtained in October operations with durian seed-

ling stocks. Air-layering of shoots in litchi by cincturing has been found to be an elegant and cheap method of propagation. Hybridization work in citrus, jack, annonaceous fruits, banana and pineapple has been put under way on planned lines and the 'Hybrid' seeds obtained in some of the crosses have been sown.

With the spice crops, clove and nutmeg, promising results have been obtained in the vegetative propagation trials. In clove, a cent per cent success has been obtained in several months of the year using clove seedlings stocks for inarching. Similarly with nutmeg 90 to 100 per cent success has been obtained in approach grafting on its own and wild putmeg, *Myristica Beddomei*, seedlings stocks. An essential oil has been extracted from nutmeg leaves with possible weedicidal properties. In cacao, nearly 12,000 seedlings of the Criollo variety have been raised for extensive distribution and trial in different regions of the State.

II. Annual programme of work for 1952-53.

Improvement work of fruits and other horticultural crops peculiar to the humid tropics such as mangosteen, mandarin orange, jack, annonas, durian, avocado, clove, nutmeg and cacao will be continued. The trials to determine suitable rootstocks and an optimum method of propagation for mandarin orange, jack, annonas, clove, nutmeg, etc., will be pursued. Isolation of superior individual trees of proved merit from the several new introductions in Mandarin orange, jack, etc., will be attempted. Hybridization work to evolve new and promising types of citrus, pineapple, banana, annonas, etc., will be pursued on planned lines. Efforts will continue for the enrichment of the collections through new introduction of varieties and kinds of plants of possible economic value to the State.

The Fruit Research Station, Kodur, Cuddapah district.

I. Results achieved in research during 1951-52.

Citrus.—Among the varieties, two of sweet orange, two of pummelo, one each of lemon and marmalade orange and the *Vadlapudi* orange registered satisfactory performance. Five suspected budspots in Sathgudi orange—four for unusually heavy cluster-bearing habit and one for off-season cropping have been located and their clonal progenies propagated. Analysis of fruits of pink-fleshed *Vadlapudi* orange mutant for brix-acid ratio has shown them to be superior to the local type. Similar analysis of Sathgudi oranges from trees on different rootstocks indicate that fruits on Sathgudi rootstock rank first while those on Gajanimma as the most inferior. In the acid lime rootstock trial, one tree on Gajanimma rootstock has given a record yield of 7,594 fruits though the yield differences between trees on the several rootstocks and

the seedlings have not proved significant. In the newly established rootstocks trial, Sathgudi and acid lime trees on Jamberi rootstocks registered the best growth in the first year of orchard life. Hybridization work in citrus has been newly taken up during the year. Seventeen "crossed" fruits involving four parental combinations in three lemon varieties have been obtained and their seeds sown. In sweet oranges, 200 crosses between four parents of three varieties have been made. Taxonomical studies of the several citrus seedling types in the collection have been completed for working out their classification.

Mango.—The highest yield in the season from an individual tree has been recorded in variety Bangalora with 1,703 fruits, weighing 927 lb. Grafts of 12 new varieties have been introduced for trial. A total of 1,168 controlled pollinations was made resulting in 13 "crossed" fruits. From among the previous crosses, 56 trees fruited of which 16 have done so far for the first time. Four of these have exhibited superior fruit quality. In the field trials, among the polyembryonic rootstocks, Pabutan for Baneshan and Olour for Neelum have proved superior to others with mean tree yields of 280 and 836 fruits respectively.

Other fruits.—Hybridization in guava has been commenced and seeds from seven "crossed" fruits involving four parental combinations have been obtained and sown. New fruit introduction includes one variety of custard apple, two of date and one of zizyphus.

II. Annual programme of work for 1952-53.

1. *Variety collections*.—The study of performance of individual trees in the varietal collections in respect of growth, yields, fruit quality, etc., will be continued and promising types and trees will be propagated through clonal progenies.

2. *Trial on methods of propagation in relation to performance in mango*.—This item is in progress and will be continued. Data on growth, yields, etc., will be collected and analysed.

3. *Double-working trial for mango*.—Studies on the performance of the trees already planted for the trial will be pursued.

4. *Polyembryonic rootstock trial for mango*.—The performance of the scion trees on polyembryonic and monoembryonic rootstocks will be compared.

5. *Shoot-growth studies in mangoes in relation to yield*.—The studies are in progress and the performance of different types of selected shoots in Neelum and Banglora varieties and the relationship between the nature of shoot and its yielding behaviour will be judged from the data collected.

6. *Top-working inferior trees in mango*.—A comparative study of economics of topworking unthrifty trees versus grubbing out and interplanting will be undertaken.

7. *Citrus rootstock trials*.—Observations in the existing plots under Sathgudi and acid lime rootstock trials will be continued.

Similar observations will be made in the newly planted rootstock trials for sweet orange, lime and lemon scions.

8. *Cultural practices versus green manuring in mango.*—This is a new item planned for studying the merits of merely intercultivating mango groves as compared with the practice of green manuring.

9. *Isolation of standard clonal strains in mango.*—This is another new item which attempts to distinguish the variability in fruit quality caused by environment, position, etc., and that due to bud variations, affording thereby a means to propagate clonal strains of standard performance.

10. *Location of desirable citrus budsports and resistant strains to stem and root disease and their propagation.*—Budsports and strains of economic value will be located through survey and their clonal progenies raised for study of performance. The performance of progenies on hand and planted in ryot's fields will be studied.

11. *Manurial trial for sathgudi orange.*—The influence of differential doses of nitrogen applied at varying intervals on the cropping in sathgudi will be studied.

12. *Pruning trial for guava.*—A trial to determine an optimum system of pruning the guava tree has been initiated and observations will continue.

13. *Hybridization.*—This work will be pursued in mango, citrus and guava as per approved programme.

*The Agricultural Research Station, Koilpatti
(Tirunelveli district).*

1. Results achieved in research during 1951-52.

(A) *Cotton breeding.*—The distribution of K.2, the new strain, was further extended during the year. Evolution of better strains under the Karunganni Scheme, has resulted in four selections having a staple length of more than one inch.

(B) *Millet breeding.*—The main work was confined to cumbu (rainfed), irungu cholam (rainfed) ragi (irrigated) and vellai cholam (irrigated).

In an yield trial with A.S. 7081 an extracted type from *periamanjul cholam* and *irungu* with *irungu* strain K.1 as standard, selection 7081, gave an increase of 16.7 per cent grain and 4.1 per cent straw, though the yield differences were not statistically significant.

Seed rate employed was 65 lb. per acre for both. In *vellai cholam* two selections K.S. 288 and K.S. 296/4 gave an increase in yield of 5.0 and 3.0 per cent respectively over strain K.2 selections, namely, A.S. 8155 and A.S. 8159 sent from Coimbatore were also included in the trial. During the period under report, seven hybrids of cumbu were tried in yield trials with K.1 as standard in both black and red soil areas. Of these seven hybrid K.1 x P.T. 504 was found superior to K.1 in the red soil area. But the same hybrid was on a par with K.1 in the black soil area. In an

yield trial of non-lodging cultures, namely, K.R. 4 and K.R. 76 with K.1 (ragi) as control, the cultures recorded increase in grain yield of 9.5 and 12.2 per cent respectively. But the yield differences are not statistically significant. The ragi strain K.1, although a heavy yielder of grain, has a tendency to lodge during the earhead formation. To remove this defect it was crossed with K.R. 4 a non-lodging culture. Of the 46 non-lodging cultures tested in preliminary yield trials in three sets, 18 are promising.

(C) *Agronomy.*—The different agronomical experiments as per the three-year programme were conducted during the period under report in the black soil area under rainfed conditions. Due to late sowing of the crop and drought that prevailed during north-east monsoon period all the three major crops, viz., cumbu, irungu cholam and cotton were partial failures, and the experiments did not give any conclusive results.

The results of all the agronomic experiments for the past three years were reviewed. With the exception of the new cultural experiment and cereal indigo mixture experiment with superphosphate, all the others will be discontinued.

(D) *Miscellaneous trials.*—(a) *Sweet potato and tapioca.*—Selection work in sweet potato and tapioca were continued.

(b) *Fodder grasses.*—In the fodder grasses trials, the Kolukatai grass out yielded the guinea grass and buffalo grass for the third year in succession.

(c) *Vegetable breeding.*—In brinjal by pure line selections two economic types, viz., 67 and 108 were evolved and they gave an acre yield of 28,642 lb. and 28,327 lb. tender fruits respectively. In chillies the 'local' type was compared with the five economic types received from Guntur. The Guntur types were of shorter duration but give an acre yield of ripe fruits ranging from 1,667 lb. to 3,229 lb. The local gave an acre yield of 6,133 lb. of ripe fruits. It is proposed to make single plant selection from the local bulk crop. In garden lab-lab 11 selections were tried but the crop failed due to adverse season.

(d) *Miscellaneous.*—The bunch groundnut failed due to drought. The safflower crop came up well and in spite of drought, selection C.T. 66 gave an acre yield of 560 lb. of grain. A trial was made to increase the water-supply in wells. Striking increase in water-supply was obtained by pumping directly from bores in the wells by inserting the suction ends into the bores.

(e) *Poultry.*—The Rhode Island Red Breed of poultry was maintained and 1,648 hatching eggs were distributed in the tract. A start was made during 1950-51 to hybridize the Rhode Island breed with the Indian Game bird. Three distinct groups of F.I. were marked and studied. All the F.I. birds are hardy and com-bine meat *cum* egg production. They have been found to give the same average egg production as that of the R.I.R. parent. The F. 2 progeny was under study.

II. Programme of work for 1952-53.

A.—*Cotton breeding*.—Evolution of high yielding strains would be carried on under the Karunganni Scheme, Koilpatti.

B. *Millets breeding*.—(1) Evolution of improved strains of (a) rainfed and irrigated cholam, (b) rainfed cumbu, (c) irrigated ragi and (d) rainfed varagu.

(2) *Agronomic experiments*.—(a) Seed rate experiment with selection A.S. 7081 and (b) time of sowing experiment in ragi.

C. *Agronomy*.—All the agronomic experiments recommended to be continued by the Cotton Specialist, the Government Agricultural Chemist, and the Millets Specialist, Coimbatore, will be repeated.

D. *Miscellaneous*.—(1) Trials of sweet potato, tapioca, fodder grasses and other miscellaneous crops will be continued.

(2) *Poultry*.—The F. 3 generation of the cross between the Rhode Island Red breed and the Indian game bird will be raised and suitable parents selected for further work.

The Agricultural Research Station, Lam P.O. (Guntur district).

I. Results achieved in research during 1951-52.

1. *Chillies*.—In the trial of G.1 and 1402 chilli on cultivator's holdings in 16 centres in the districts, 1,402 gave the highest yield of 1,194 lb. of dried chilli per acre with an average increase of 55 per cent over the local. On the station, 412 cultures were tested for yield in replicated row yield trials and six of them gave significantly higher yield than the standard. During the year 153 crossed pods were obtained from 1,485 crosses made involving 52 combinations. The study of the internal structures of leaves of different varieties did not reveal any striking structural differences. Estimates by taste for pungency were not helpful. In regard to localization of pungency within the pod, it was seen that placenta and the base of placenta were the pungent parts of the pods. The trials of insecticides for controlling thrips damage for a second season confirmed the previous findings, namely advantage of BHC. 50 per cent (P. 520/Spray) in checking deterioration of the crop and enhancing the yield. The results of spacing trials combined with number of seedlings planted per hole showed that planting singles at 6 inches by 22 inches was as good as planting in bunches at 22 inches by 22 inches. During the year, 154 types obtained from different parts both from India and abroad were grown and studied. It was found that varieties from Sabour (Bihar) were relatively late to the break down of thrips incidence.

2. *Cotton*.—C.1 and C.2 cotton were multiplied and 326 lb. of seed of the former and 224 lb. of seed of the latter were obtained and distributed for raising seed farms in the district. In order to study whether presoaking of cotton seed in nutrient solution will

improve the yield of cotton. C.1 seed was subject to different treatments and then sown. The yields recorded reveal that soaking the seed in Molar and quarter Molar Mono Pottassium phosphate and quarter Molar Ammonium sulphate were only as good as unsoaked seed, while the yields were poor with other treatments. In order to study whether any of the short duration cotton when sown along with chilli could finish its harvest along with chilli an observation trial with eight varieties of cotton were laid out and it was found that none of the cotton varieties tried are able to complete its life period along with chilli. Among the perennial cottons grown, Moco maintained its superiority over other types in yield.

3. *Coriander*.—The selection work to evolve a high yielding strain was continued. Study of samples of Tamilnad and Andhra Desa, reveal that Guntur 14 bulk of Guntur district and Kovilpatti bulk of Tirunelveli district were better than Ongole local in yield. During the year 51 single plant selections were tested, for yield and only one among them recorded significantly higher yield than the standard while the rest were on a par with the control. Twenty-five extra state and 2 extra Indian samples were obtained for study. The samples obtained from Uttar Pradesh, Hyderabad and Madhya Bharat recorded higher yields than local.

4. *Tobacco*.—H.S. 9 tobacco was grown and 29 lb. of selfed seed was obtained for distribution.

5. *Millets*.—The main work was the multiplication of seed of strains G.1, G.2 and G.4 in cholam and G.1 korra. A total quantity of 7,000 lb. of seed was obtained for distribution in the Striga Scheme, it was found that the incidence of striga was very sparse in spite of artificial infection of the soil. In pure culture plots A.S. 4003 (Bonganhi) a strain reported to be resistant to striga was stunted in growth and matured late with poor grain setting. About 16 crosses of G.1 and A.S. 4003 and 18 crosses of G. 2 and A.S. 4003 were effected during the year.

6. *Manurial experiments*.—The experiments started in 1950-51 with the object of studying relative effects of night soil compost and farmyard manure on chilli and varagu crops, were repeated during the year. Due to adverse seasonal conditions, no reliable data could be had from the experiments.

II. Programme of work for 1952-53.

I. *Chillies*—(A) *Breeding*.—

- (1) Trial of promising cultures in cultivators' holdings.
- (2) Trial of promising cultures in replicated small bulk trials.
- (3) Trial of cultures in progeny rows.
- (4) Study of collections obtained from different parts of India and abroad in observation plots.
- (5) Study of second generation hybrid populations.
- (6) Study of hybrid vigour in first generation crosses.

(B) *Fundamental*.—(1) Study on grading of thrips incidence on chilli.

(2) Study of pungency.

(C) *Agronomic*.—Experiments on cultural and agronomic aspects for increasing production in chilli.

II. *Cotton*.—(1) Chilli-cotton mixed cropping trials.

(2) Trial of dibbling H. 430 cotton in standing groundnut crop at different stages of growth of groundnut.

(3) Leguminous crops and their effect on cotton succeeding crop.

(4) Maintenance and seed multiplication of C. 1, C. 2 and H. 420 strains.

III. *Coriander*.—(1) Trial of single plant selections in replicated row yield trials.

(2) Growing and study of bulk samples received in non-replicated observations plots.

(3) Studying the correlation between pigment, pericarp size, earliness, habit and yield.

IV. *Tobacco*.—Maintenance and production of selfed seed of H.S. 9.

V. *Groundnut*.—Trial of groundnut varieties in replicated plots.

VI. *Millets*.—Seed multiplication of G. 1, G. 2 and G. 4 jonna and G. 1 korra strains.

VII. *Other trials*.—(1) Rainfall and crop yield correlation trial.

(2) Night soil compost, farmyard manure experiment (variga and chilli) third year.

(3) Study of linseed varieties in observation plots.

(4) Study of dry paddy varieties in observation plots.

(5) Trial of chilean nitrate and other manures for chilli.

(6) Trial of wheat followed by tobacco.

The Paddy Breeding Station, Mangalore
(South Kanara district).

I. Results achieved in research during 1951-52.

Paddy—Pure line selection.—One culture in red riced Kayama, one in Kanwa and one in Athikraya have finished the final trials in the district and will be issued as strains. They will serve one and a half lakhs of acres in the district. Two cultures in each of Halluga and Maskathy were again sent to the district for trial. Work in white riced Kayama was continued. Certain strains evolved on other stations, e.g., PTB. 20 and PTB. 4 for second

crop and MTU. 3 for the first crop in Godavari districts were found to be useful.

Hybridisation.—Crosses were made for evolution of a plant with stiff straw and they are at different stages of study. One hybrid culture 8448 was found to be as good as Co. 3 and did not deteriorate in germination. This will enable the ryots to grow larger area of this strain which is in demand during second crop season.

Agronomy.—There are indications of deficiency of lime in soils. It was observed that there is no advantage in the practice of applying 'burnt' cattle manure and soil (sudu mannu). Bonemeal was found to be better than super phosphate.

Other crops.—Exotic varieties of sweet potato V. 1, V. 12, and B. 219 were found to be high yielding than the local. Application of 50 lb. Nitrogen to this crop increased the yield by about 50 per cent. Trials of sea Island cotton were continued.

II. Annual Programme of work for 1952-53.

I. *Paddy—Pure line selection*.—(i) Maintenance of purity by progeny rows and production of nucleus seed for 100 acres of primary seed farm.

(ii) Continuation of district trials in Kayama, Mascathi, Halluga and Athikraya.

(iii) Continuation of trials for evolution of strains in white riced Kayama and Doddarai.

(iv) Fresh selection work in Mascathi will be undertaken.

II. *Hybridisation*.—(i) Study of F. 1's crosses made for non-lodging and high yield characters.

(ii) Continuation of yield trials of Kavunginpothala by GEB. 24 cross progenies.

III. *Manurial trials*.—(i) Continuation of trials with bone-meal and super.

(ii) Studies on the effect of continuous application of ammonium sulphate.

(iii) Continuation of studies on the effect of certain strains on the following crop of rice.

IV. *Cultural trials*.—(i) Study of strains for their suitability for raising early versus late nurseries.

V. *Other crops*.—(i) Varietal and cultural trials on sweet potato.

(ii) Adoption of methods to make the station self-sufficient in green manuring.

(iii) Trials of groundnut and cotton in rice fallows.

(iv) Continuation of trials of blackgram.

(v) Trials of Sea Island Cotton.

*The Agricultural Research Station, Maruteru
(West Godavari district).*

I. Results achieved in research during 1951-52.

Pure line selection.—Two cultures in Pedda Atragada were under district trials in Repalli taluk. One culture 4250 was more promising. Pedda Kusuma culture 4688 gave 76 per cent higher yield over the ryots bulk.

Hybridisation.—Two cultures gave higher yield than MTU. 15. In the cross made to improve the quality of rice in local Nallarluru one culture No. 60 gave a very good yield. Amongst the 94 crosses made to evolve high quality rice in rainfed paddy, 30 promising cultures were carried forward. Culture 1781, gave 9.4 per cent increase in yield over the popular strain MTU. 1. Three cross progenies were found to be less affected by smut than MTU. 10. Further trials will be made. Two cultures gave high yields than GEB. 24.

Agronomy.—Farm-yard manure and compost at 60 lb. N. does gave significantly higher yield over no manure. Application of phosphate (P 05) to the green manure crop indicate a better response than when phosphate (P 05) is directly applied to the paddy crop. By the placement of ammonium sulphate, the rank growth of vegetation in paddy, is checked and the crop does not lodge.

Short duration cotton and groundnuts were tried in rice fallows. It was found that dibbling of cotton in ploughed land was better than dibbling in unploughed land.

A total quantity of 3,500 lb. sesbania seed was collected by planting seedlings on the field bunds and 2,000 to 4,000 lb. of green leaf per acre was obtained by planting them on margins of fields.

II. Annual Programme of work for 1952-53.

I. Pure line selection.—(i) Production of nucleus seed and maintenance of purity of the 21 strains by progeny rows.

(ii) Continuation of district trials of the promising cultures in Pedda Atragada and Pedda Kusuma.

(iii) Yield trials of short duration strains in the second crop season.

(iv) Yield trials of further selections in Akkullu and Kusuma.

II. Hybridisation.—(i) Continuation of studies of the inter-strain crosses and wild rice crosses which are in different generations.

(ii) Continuation of yield trials of cross progenies isolated in the inter-strain crosses against the popular strains.

(iii) District trials of cultures suitable for low lying areas. Two cultures of Krishnakatukulu, one culture of Atragada, two

cultures of Pedda Atragada and three cultures of Sanna prayaga will be tried in representative localities in the districts of West Godavari, Krishna and Guntur.

III. Agronomic and manurial experiments.—(i) Experiment with farm yard manure and compost will be continued in double-crop area and the residual effect of these manures in single-crop area and second-crop area will be studied.

(ii) Experiments to study the placement effect of ammonium sulphate, on rice will be continued.

(iii) Experiments to study the effect of phosphatic manures on the succeeding rice crop when applied to the green manure crop will be continued with two kinds of green manures, viz Pillipesara and Daincha.

(iv) Trials to determine the effect of growing a single strain continuously as against the ryots bulk in the same land on soil fertility will be continued.

IV. Other crops.—Trials of groundnut, gingelly, cotton and wheat will be continued.

The Agricultural Research Station, Nandyal (Kurnool district)

I. Results achieved in research during 1951-52.

(a) **Sorghum.**—Breeding work on Mungari Patcha Jonna was continued. The three mungari types N.J. 6, 16 and 20, which are establishing in Pathikonda, Dhona and adjoining area, were given station numbers as N.10, N.11 and N.12. The juicy and pithy strains N1 and N9 were sown for maintenance of nucleus seed and multiplication. A total quantity of about 18,000 lb. of seed was produced for supply to primary seed farms in Kurnool and Cuddapah districts.

The work on the control of striga, the root parasite on Sorghum by agronomic and breeding methods were continued with the financial assistance of the Indian Council of Agricultural Research. Deep ploughed plots showed less of striga.

(b) **Cotton**—(1) *White Northern Scheme.*—The breeding work on the White Northern Cotton, under the auspices of a Scheme financed by Indian Central Cotton Committee was continued. Due to adverse seasonal conditions the crop failed in most of the taluks in the district. Spinning and microspinning test reports on the selections tried, reveal that many of them are as good as N.14 in quality but gave 5 to 8 per cent more ginning. The unusually bad season prevents drawing conclusions and necessitate further trials in the coming season.

(2) *Cambodia Breeding Scheme—Hagari and Nandyal*—(1) *Bulk yield trials.*—About 20 cultures were tested both in Hagari and Nandyal with the local 'deshi' type as control. The results

reveal that (i) at Hagari, 'Laxmi' (G1 × Co2-9-3) is found to give good yield, (ii) culture 320 of M.A.2 origin is promising at both the centres. The yield level at Nandyal was low due to adverse seasonal conditions.

(ii) *Compact family blocks*.—At Hagari, 31 families were tested for purity and estimation of yield, while at Nandyal 25 were sown for study. At both the centres, only culture 167 was promising, cultures 569 and 579 at Hagari and cultures 327 and 571 at Nandyal were promising.

(iii) *Progeny rows*.—At Hagari 148 cultures were sown in two sets of Progeny rows. At Nandyal, 176 cultures were raised in two sets. After critical study 106 cultures at Hagari and 62 cultures at Nandyal were harvested for laboratory examination. Data gathered reveal that seven at Hagari and six at Nandyal are promising for carrying to further stage.

(iv) *Hybrid studies*.—About 99 first generation hybrids sent from Siruguppa were raised at both the centres and suitable single plant selections have been effected. The selected single plants will be sown in the coming season and studied.

(v) *District trials*.—During 1951-52 season, trials with Laxmi, M.A.2 and H.A.11 were conducted in the districts of Bellary, Anantapur, Kurnool and Cuddapah, with the local cotton as control. It was seen that 'Laxmi' cotton in general recorded 51 per cent increase in yield (kapus) over the control.

(3) *Experiments on cotton extension*.—Trial of early varieties of Cotton as mixtures with groundnut was continued. 881F was found to yield highest during this season also though late by a fortnight than the other varieties like 1973, H.420, Pratap and Umri. The reduction of groundnuts due to mixture of Cotton was non-significant and the yield of cotton more than compensated the reduction in groundnut yield.

Cotton as a mixture with either Korra or groundnut was found to be more paying than Redgram mixtures.

(c) *Other Crops*.—Bunch groundnut trials were conducted for a third year. TMV.2. was found to be as good as local. In the two previous years it was the best. Taking into consideration the results of all the three years TMV.2. appears to be the best.

Redgram varietal trials were a failure. In the wet lands GEB.24, SR.26B and No. 6612 (Bangarathegalu selection) were sown for seed multiplication. Culture No. 6612 gave slightly better yield than GEB.24 and is finer. It is nearly of the same duration as GEB.24. and appears suitable for district trial.

II. Programme of work for 1952-53.

Breeding programme of cotton and Millets will be continued. Trial of redgram varieties from the Pulses Specialist, will be repeated again.

Multiplication and maintenance of nucleus seed of all the improved strains under distribution and supply of seed for primary seed farm in the district will be continued.

Experiments on cotton extension such as groundnut/cotton mixture trials, and intersowing of cotton in groundnut, conduct of manurial cum residual effects, trials of leguminous crops for increasing cotton yields will be conducted.

Observational trials to study possibilities of raising green manure crops *in situ* and ploughing in as green manure for increasing sorghum yield will be laid out as preliminary to regular experiments.

The Agricultural Research Station, Nanjanad (The Nilgiris).

I. Results achieved in Research during 1951-52.

Potato.—The popular potato variety, *Great Scot*, was multiplied for seed and a total quantity of 51,944 lb. of seed sold to ryots.

Promising exotic varieties, including the newly imported 24 Dutch varieties and cultures received from the potato Breeding Sub-Station, Simla, were tested for yield and carried over for further trials.

It was conclusively proved that planting the—main potato crop in the middle of April and the second crop early in August resulted in enhanced yields. Mulching of the crop with dried vegetable refuse also improved the yields.

Investigations reveal the use of a chemical product containing methyl-ester of naphthalene acetic acid as a valuable preservative for cutting down storage losses in table potatoes.

Positive indications were obtained in favour of the use of DDT. and BHC in the control of potato tuber moth attacks in the field.

Trial on the chemical control of weeds in cereal fields by use of Di-nitro-ortho-cresol preparation, gave striking results.

Other crops and plants.—A record quantity of over 5,000 lb. of lupin seed was produced for disposal as green manure seed. All uncultivable wastes were put under the crop.

Plants of economic importance such as different varieties of Eucalyptus, wattle, cypress, blasam and camphor, forage crops like different grasses, clovers, vetch rape and *Lespedeza* were raised. A total number of 4,150 blue gum seedlings was planted.

Besides partaking in the various local and mufussil exhibitions and shows, four quarterly agricultural exhibitions and Farmer's Days were held on the station, in which the cultivators took part and received awards for the best exhibits produced on their holdings.

II. Programme of work for 1952-53.

Potato.—(1) Multiplication of important varieties and cultures and certified class 'A' *Great Scot* seed, received from the United Kingdom.

(2) Trials on strip-cropping potato with the cereal (*Samai*) to study the effect of such a practice on prevention of soil erosion;

(3) studies on the effect of delayed harvest on potato yield;

(4) investigations on the influence of different spacings of the row on potato yield;

(5) studies on the use of new nitrogenous fertilizers like urea and Chilean Nitrate of Soda for potato.

(6) influence of the reduction and increase of the nitrogen and phosphoric acid contents of the Nanjanad mixture on yield involving application of lime and green leaf to the soil;

(7) use of calcium carbonate sludge or slurry (a byproduct of the ammonium sulphate industry) as a manure for potato;

(8) studies on the control of Early Blight on potatoes with new brands of fungicides; and

(9) outstation trials with potato varieties suited to the plains during winter.

Other crops.—Trials with improved strains of *samai* and *ragi*, Australian rust-resistant wheat varieties, buckwheat and 6 rice cultures of Chinese and African origin, reported to have done well in Kashmir. Extension of the area under lupins and other green manure plants like clovers, vetch and rape. Trials with forage crops and grasses. Multiplication of plants of economic importance.

The Agricultural Research Station (Nileshwar) II (South Kanara district).

I. Results achieved in research during 1951-52.

Coconut.—I. *Coconut breeding*.—The Station is devoted mainly to the study of progenies of coconut obtained under different methods of pollination and from different types and varieties of palms. The observations made so far on the young progeny palms reveal that—

(1) Selfing in coconut as a method of crop improvement is not useful, as selfed progenies are least vigorous in growth as well as in reproductive characters.

(2) Progenies from low yielding parents especially those yielding 40 nuts and below per tree, per year are generally poor and not suitable for propagation.

(3) Progenies of intra-varietal crosses among the West Coast 'Tall' varieties with different character combinations do not indicate encouraging results.

(4) Progenies of inter-varietal crosses between the West Coast Tall and the Dwarf continue to be quite outstanding in respect of all the economic characters.

Progenies of other inter-varietal crosses and F2 progenies of Tall X, Dwarf were under observation.

II. *Trials to increase the humus content of the soil*.—(1) *Trial to determine the optimum seed rate for Crotalaria Striate*.—The trial in progress from 1948 has not given conclusive results. The trial will be repeated.

(2) *Other green manure crops*.—*Calapogonium muconoides* was found to be a good cover crop for the West Coast. About 42 lb. of *calapogonium* seed was collected and distributed to different centres for trial. *Peararia phaseoloides* is also quite good for the tract. *Peararia* is better than *Calapogonium* as the former could be easily propagated by cuttings and it maintains the growth even during summer months.

Gliricidia is found to grow excellently well under West Coast conditions. Large scale planting of 3,800 rooted cuttings was done all along the borders of the station during the year. *Sesbania speciosa* planted along the drains and channels was also under observation. The growth of a few plants of *Indigofera teysmanii* under observation promises to be a useful introduction.

(3) *Watering experiment*.—Watering the coconut trees in the red loamy soils was found to benefit the trees considerably in increasing the production of leaves, female flowers and nuts. The economic increase in the yield of nuts will be worked out when sufficient data are gathered. The watering the trees commenced only in the summer months of 1950.

(4) *Raising of subsidiary crops*.—Planting of pepper vines was done in June 1952 at the Station for the first time using coconut tree trunk as standard. Twenty trees were utilized for the trial. The growth of the vines are being watched. Food crops like paddy, *ragi*, sweet potato, tapioca, groundnut, *Amaranthus* and vegetables were raised in the non-experimental blocks with a view to increase the revenue of the station. The crops were raised in between rows of coconut trees.

(5) *Button shedding*.—*Planofix*, a fruit-drop inhibitor, was tried by spraying the same on the inflorescence of the coconut with a view to see whether it could effectively control the shedding of buttons. It was found that the chemical had the effect in controlling the shedding of buttons.

(6) *Control of rhinoceros beetle*.—Spraying the crowns of coconut trees with DDT.550 was found not effective in preventing the incidence of the pest; but it reduces the incidence to a fair extent.

(7) *Viability test for crotalaria striata seeds.*—The viability tests conducted with *Crotalaria striata* seeds indicate that viability decreases with increase in storage period. Loss of viability is very rapid in seeds stored in gunny bags as compared to the seeds stored in screw capped bottles.

(8) *Production of economic plants.*—Large scale production of Malta lemon rooted cuttings and root stock for grafting mangoes was undertaken during the year. Also large quantities of bendai, Amaranthus, Kapak and cashewnut seeds collected during the year were distributed to the district staff for sale to ryots.

(9) *Copra and oil studies*.—Copra and oil from the nuts of the Tall x Dwarf progenies compare favourably with those of the West Coast Tall Variety of palms.

II. Programme of work for 1952-53.

1. Study of the various progeny palms will be continued.
2. Study of copra and oil of the nuts from Tall x Dwarf will be continued.
3. Large scale production of Malta lemon, graft mangoes, vegetable seeds and seeds and seedlings of other economic plants will be maintained.
4. Growing of subsidiary food crops in the main blocks in between rows of coconut trees will be continued.
5. Growing of green manure crops of *Gliricidia*, *Sesbania*, *Galapogonium peuraria*, etc., will be intensified.

The Agricultural Research Station, Nileshwar III (South Kanara district).

I. Results achieved during 1951-52.

Coconut—(1) *Cultural experiments*—*Depth of cultivation*.—The experiment started in 1948 with the object of determining the correct depth at which the soil in a coconut garden (sandy soil) is to be cultivated, has not given any conclusive results so far. The treatments consist of—

- (i) Ploughing the garden thrice 4 inches deep with Cooper 26 plough.
- (ii) Ploughing thrice 6 inches deep with Victory plough.
- (iii) Digging the soil 5 inches deep with mamutty and forming mounds in September and levelling them in December-January.
- (9) *Trials to increase the bumper*

(2) *Trials to increase the humus content of the soil.*—*Crotalaria striata* was found by trial to be best suited green manure crop. Among the various other green manure crops tried, it was found that *Peuraria phaseoloides* was quite a good cover crop. *Gliricidia* does not grow well in the sandy soil at the Station. Over 2,000 rooted cuttings have been planted in 1952. They appear to get established earlier and better than either seedlings of fresh cuttings.

(3) *Depth of planting experiment.*—The data gathered in 1951 on the vegetative characters of palms planted in three feet deep pits and six feet deep pits, when examined did not show any significant differences. But it was observed that greater number of palms flowered among the 3 feet deep planted ones.

(4) *Watering experiment*.—Watering of the poor trees in the sandy soil in summer was started in 1945. An alround improvement in the condition of the trees including the yield of nuts was observed in 1950. The condition is not maintained as judged from the data gathered in 1951 except with regard to number of leaves in the grown and rate of production of leaves.

(5) *Underplanting trials*.—The surface planted trees at the station are very poor. Underplanting was, therefore, attempted in 1948 in a small area with 60 seedlings in 3 feet deep pits and 60 seedlings in 2 feet deep pits for observation. The growth of the seedlings at this stage is found satisfactory.

(6) *Production and supply of pedigree coconut seedlings.*—The station is mainly devoted to the production and supply of pedigree seedlings. A separate scheme with a target of 60,000 seed nuts every year is being worked at the station. A total of over 50,000 seedlings of West Coast Tall, Tall x Dwarf, Dwarf and selected exotic varieties are produced every year and distributed and the demand for the selected seedlings from the Station is very high.

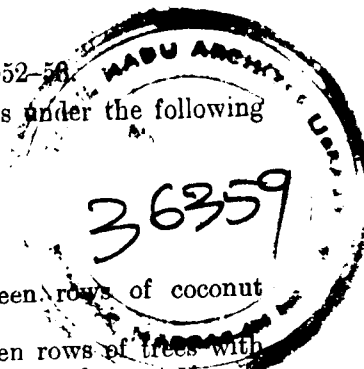
(7) *Production of economic plants.*—Large scale production of Malta lemon rooted cuttings and papaya seedlings was also done during the year. Large quantities of cashewnut seeds and vegetable seeds were also distributed during the year.

(8) *Filter point*.—With a view to increase the irrigation facility a 3 inches filter point was successfully installed at the station during the year. The filter point gives a discharge of 5,600 gallons of water per hour when worked with a 3 inches by 3 inches oil engine of 7-10 h.p.

II. Programme of work for 1952-56

The observation on the character of palms under the following experiments will be continued—

- 3635
- (1) Depth of cultivation.
 - (2) Depth of planting experiments.
 - (3) Under planted seedlings.
 - (4) Watering experiments.
2. Growing of subsidiary crops in between rows of coconut trees will be intensified.
3. Growing of coconut nurseries in between rows of trees with a view to indirectly benefit the poor trees due to the watering of the nursery in the summer months.
4. Increased production of Tall x Dwarf seedlings for supply.
5. Increased production of Malta lemon rooted cuttings, papaya seedlings and graft mango seedlings.



J. 811 x 0151

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The Government Botanic Gardens, Ootacamund (The Nilgiris).

1. Results achieved in research during 1951-52.

As in previous years, numerous varieties and kinds of ornamental, economic and medicinal plants, vegetables and fodders introduced during this year were under trial and observation. Among vegetables are tomatoes from Raj Bhavan, Ootacamund, Chicago cucumber varieties from Pomological Station, Coonoor, Kallar and Burliar Fruit Stations and Agricultural College Orchards, Coimbatore, Chicago corn from Coimbatore, "Pomocol" Cauliflower and "early drumhead cabbage from Pomological Station, Coonoor."

New introductions among the ornamental plants include species of lilies, Anemone Biflora and Anemone St. Brigid named varieties of Daffodils, and Ranunculus from Kashmir, *Sternbergia*, *Lutea*, *Satyrium Napalense*, *Habenaria Subannae*, red, white and yellow Zephyranthes, cannas mixed from various sources and tetrasnaps and polyanthus from a local source. Successful among introductions of various varieties of trees and shrubs include *Quercus Incana*, *Deutzia Corymbosa* and *Berberis Umbellata* raised from seeds obtained from Loyd Botanic Gardens, Darjeeling, *Ocimum Camphora*, the camphor yielding ocimum and the oil yielding scented Geranium have been successfully established and from these oils were also distilled. Introductions among fodder and pasture plants include five species of clover, viz., *Trifolium Subterraneum*, *T. Pratense*, *T. Repens*, *T. Incarnatum* and Ladina clover and seeds of some more species along with some grasses from Holland await sowing. *Aleurites Fordii* and a *Montana* (the Tung oil trees) Malta lemon and Seville lemon were also introduced.

The vegetative propagation trials with cuttings of *Magnolia Grandiflora*, *Quercus Serrata* and *Wistaria Chinensis*, studies on the dormancy and viability of seeds of trees such as *Eucalyptus Globulus*, *Cupressus Macrocarpa* and *O. Torulosa*, both of which were started in May 1951 were continued. Preliminary trials on the unusual methods of propagations of various plants were continued. Extraction of essential oils from five species of *Eucalyptus* and four other oil yielding plants, viz., scented geranium, citronella and lemon grass and *Ocimum Camphora* were successfully distilled. The collection and study of wild flora of the Nilgiris and of medicinal plants was also pursued.

Studies on the growth, performance and flowering habits of annuals, trees and shrubs were continued so as to be of assistance in designing gardens, parks, etc.

II. Programme of work for 1952-53.

Besides attending to keeping up the gardens as pleasure resort to the public, introduction of new flower plants, vegetables and other economic plants will be made. Studies on the growth and

flowering habits of ornamental plants and trees will be continued. Trials in propagation methods of different flowering plants and other economic plants will be made.

The Agricultural Research Station, Palur (South Arcot district).

I. Results achieved in Research during 1951-52.

1. *Paddy*—(a) *Kar season*.—Two swarnavari paddy selections of Tirukuppam 2332 (strain TKM 3) and 2473 yielded about 11 per cent more grain than the farm strain S.W. 1251 and were about a fortnight earlier in duration. TKM 3 grown on a bulk scale for seed multiplication recorded an acre yield of 3,811 lb. grain and was multiplied on a large scale and distributed to primary seed farms. PLR 2 planted in crop competition plot recorded an acre yield of 8,379 lb. grain.

(b) *Samba season*.—Chingleput Sirumani strain Co. 19 and blast resistant strains Co. 25 and Co. 26 recorded 3,123 lb. 3,254 lb. and 3,112 lb. of grain per acre respectively in spite of the adverse seasonal conditions during the flowering and ripening stages of the crop. PLR. 1 (Garudan samba) yielded 2,990 lb. grain per acre. While Co. 19, Co. 25 and Co. 26 were free from blast disease, PLR. 1 had a slight attack. During the samba second crop (thaladi) season ASD. 5 (Karthigai samba) recorded an acre yield of 2,632 lb. grain in spite of the unfavourable seasonal conditions that prevailed throughout its growth period.

(c) *Navarai season*.—(i) Swarnavari strains S.W. 7 and S.W. 1251 fared best while TKM. 3 (Swarnavari of Chingleput), Co. 13 (Arupatham Kodai) ADT. 16 (Kona kuruvai) and ADT. 20 (hybrid kuruvai) recorded poor yields.

(ii) Vellaikar culture 10077 recorded increased yields over Mottakar standard.

(iii) Mottakar cultures 10169 and 10178 gave increased yields over Mottakar standard.

2. *Millets*.—Ragi selection R. 382 and Varagu selections A. 117 which were consistently giving the highest yields both on the station and in the districts were released as improved strains P. 1. ragi and P. 1. varagu.

3. *Miscellaneous*.—Varietal studies with tapioca showed that Bassoria and Haparica were the heavy yielding varieties suited for the locality. Trials with lady's fingers varieties indicate that Coimbatore local followed by H.E. 31, H.E. 151 and H.E. 159 were good yielders for the tract.

About 42,657 lb. of paddy seed, 7,632 lb. of ragi seed 952 lb. of varagu seed, 540 lb. of cumbu seed, 250 lb. of redgram seed, 227 lb. of gingelly seeds 1,965 lb. of groundnut pods besides small quantities of vegetable seeds and planting material of other crops such as fruits, tapioca, fodder and green manure crops were distributed.

Borewells were tried for the first time on the station. At selected spots bores were driven by set bores and water was lifted out by pump. Copious supplies were obtained.

II. Programme of work 1952-53.

I. *Paddy*.—(1) *Varietal trials*.—Comparison of strains evolved at the station and in other Agricultural Research Stations for Kar, Samba and Navari seasons.

(2) *Hybridisation*.—(i) Studies of 10 F. 2 progenies of Indica and Japonica paddy received from Cuttack.

(ii) Preliminary yield trials of blast resistant F. 4. progenies.

(iii) Preliminary yield trials of alkaline resistant cultures.

(3) *Manurial experiments*.—(i) Trials to determine the organic matter requirements of soil in the shape of cattle manure, green manure and compost with basal dressing of 45 lb. of nitrogen as ammonium sulphate and 60 lb. of P.205 as superphosphate.

(ii) *Permanent manurial experiments*.—To find out the direct manurial value of organic manures and in-organic fertilisers and to find out the necessity for limiting paddy soils.

(iii) *Nutrient requirements of paddy*.—To find out the economic dose of nitrogen and phosphatic acid required for paddy.

(iv) Trials to determine the best method of application of phosphatic manures to rice—Either direct application to paddy or indirect application to the preceding green manure crop and to determine also the best green manure that responds to this treatment.

(v) Green manure experiments—*Sesbania speciosa*—use in the dry form.

Treatments—

(1) Drying and bundling the green manure and stacking in the field.

(2) Drying the green manure fully and stacking in the field covered with a small amount of earth.

(3) Partial drying of the green manure and stacking it in the field covered with a small amount of earth.

(4) Ploughing the field dry and applying the chopped green manure, in the furrow and levelling.

(5) Applying green manure fresh.

(6) Ammonium sulphate—application to paddy—observation trials.

Treatments—

(1) Broadcasting—30 lb. Nitrogen 30 days after planting.

(2) Two-third of ammonium sulphate as clay balls at planting time and one-third after one month applied 2 inches—3 inches below the surface.

(3) Same as (2) but ammonium sulphate broadcast.

Basal dressing—30 lb. P.205 plus green leaf.

II. *Ragi*.—Two seasons—May to September and December to March—(a) *Varietal trial*.—Trials with the farm selections and AKP strains will be continued.

(b) *Cultural*.—To compare the yielding quality of seed of two seasons—May to September and December to March.

(i) P. 1. May seed vs. December seed.

(ii) AKP—May seed vs. December seed.

(c) *Manurial*.—(1) Chilean nitrate trials with P. 1. ragi.

(2) Mixed cropping experiment with ragi, groundnut and cotton.

III. *Varagu*.—Seed multiplication of varagu strain P. 1.

IV. *Groundnut*.—(1) *Yield trial*.—Comparison of A.H. 4218, A.H. 4515, A.H. 6481 with TMV. 2. standard.

(2) Growing of TMV. 2 in rice fallows.

(3) Seed multiplication of TMV. 4.

V. *Cotton*.—(1) Mixed Cropping trials.

(2) Growing of P. 216 F. in rice fallows.

VI. *Redgram*.—Growing of strain No. G. 37 as a mixed crop with varagu as a dry crop.

VII. *Greengram*.—Seed multiplication of Greengram strain No. 62, Gingelly strain TMV. 3, Valencia Tapioca *Sesbania speciosa* and *Daincha*.

VIII. *Sweet potato*.—Varietal study of 14 varieties received from Bapatla and 5 received from the Paddy Specialist, Coimbatore.

IX. *Vegetables*.—(1) Seed production of brinjal cluster beans Cowpea-419 and New Era, lab-lab, bitter gourd, snake gourd, tomato and bendai.

(2) Varietal trials of bendai varieties and isolation and seed multiplication of promising types.

X. *Fruits*.—(1) *Banana*.—Varietal study to select types suitable to the locality.

(2) Raising seedlings and plants of jack, mango guava, sapota, lemon, etc., from seed, by grafting and by layering.

XI. *Fodder crops*.—(1) Thin Napier grass.

(2) Guinea grass.

(3) Buffalo grass.

(4) Hybrid cumbu × Elephant grass.

XII. *Poultry*.—Maintenance of Rhode Island Red poultry.

The Agricultural Research Station, Pattambi (Malabar district).

I. Results achieved in research during 1951-52.

Paddy strains released.—Two strains in Elapapuchamban and Aruvakarai for the first crop season and Arikirai for the second crop season are ready for release and nucleus seed was issued to the District officers for multiplication.

Selection work in progress.—Six cultures in two varieties were selected for district trials in the ensuing first and second crop seasons. Thirty-one cultures in three varieties were under yield trials on the station and promising material was carried forward.

Hybridisation.—Twelve cultures of crosses made for the evolution of stiff straw and high yielding medium duration second crop strains, were under yield trials. Three cultures were compared for evolution of a non-deteriorating Co. 3 strain one culture recorded 13 per cent increase in yield. Four hundred and sixty-six selections from inter strain cross were studied and 47 promising ones were selected for further work to synthesise the good characters in the respective strains.

Cultural trials.—Treatment of paddy crop with BHC at 0.1 per cent appeared to be useful in mitigating damage from stem-borer; spraying the modern rice crop with 'dicotox' of strength 1—100 killed the weeds, but did not prevent further development.

Manurial trials.—It was found that a combination of 10 lb. N as green leaf plus 20 lb. N as ammonium sulphate secured the best yield in rice. Application of 500 lb. groundnut cake and 4,000 lb. wood ash gave 30 per cent increase over 2,000 lb. of green leaf alone.

Other crops.—Trials of Sea Island Cotton were continued. Cultural and manurial experiments on ginger were in progress. It was found that cattle manure was the best for ginger.

II. Programme of work for 1952-53.

I. *Pure line selection.*—(i) Maintenance of purity by progeny row and multiplication of nucleus seed for 300 acres of primary seed-farm.

(ii) Continuation of district trials of Chornali.

(iii) Continuation of studies of culture in Vallachamba, Velutharkayama and Chuvanna Vellakoli.

(iv) Fresh selection work in Vadakan of the sandy areas of North Malabar.

II. *Hybridisation.*—(i) Continuation of studies of crosses made for evolution of a non-deteriorating Co. 3. type.

(ii) Evolution of high yielding short and medium duration second crop strains from the inter strain cross.

(iii) Studies of the F. 2s of crosses made for stiff straw in first crop strains and high quality PTB. 2, a popular first crop strain.

III. *Manurial trials.*—(i) Continuation of trials to find out the best combination of organic and inorganic nitrogen.

(ii) The residual effect of high manuring of first crop on second crop.

(iii) Continuation of studies of 'laterite soils'.

(iv) Efficacy of Phosphate (P205) application direct to rice crop versus its application to green manure crop preceding rice.

(v) Experiments on liming soils.

IV. *Cultural trials.*—(i) Stem-borer trials with different insecticides.

(ii) Trials of weedicides on Modan paddy.

V. *Other crops.*—(i) Trials on sea Island cotton in collaboration with Cotton Specialist.

(ii) Continuation of studies on the improvement of ginger (Indian Council of Agricultural Research Scheme).

(iii) Continuation of trials on tapioca—Varietal and manurial.

The Agricultural Research Station, Pattukkottai (Tanjore district).

I. Results achieved in research during 1951-52.

Paddy varietal trials.—A modified experiment was conducted during 1951-52 in which six varieties in each of the short and long duration varieties of samba and kuruvai of almost uniform duration were compared. The varieties selected have been found to be quite suitable for the tract.

Among the short duration varieties of kuruvai, ADT. 4 was found to be the best and ADT. 16 was the best among the long duration ones during 1951-52. In the case of samba, Co. 25 was found to give the maximum yield among the long duration varieties of samba and ADT. 8 among the short duration varieties.

During the year 1951-52, 21 cultures of Aranthangi varieties of paddy were raised in trial plots in which cultures 208, 424 and 936 have given the maximum yield as against kattai vellai, kodai vellai and kaivarai samba.

Irrigation experiment.—The experiment was conducted as prescribed by the Chief Engineer for Irrigation in kuruvai and samba with ADT. 4 and Co. 19 varieties of paddy for the second year and third year, respectively. The results are under statistical analysis. The experiment has been discontinued during 1952-53 as per instructions of the Chief Engineer.

Groundnut.—Groundnut T.M.V. 1 was sown in dry lands as a mixture with groundnut and redgram in separate fields. A small quantity of sunnhemp seed at the rate of 4 lb. per acre was also sown in each field as a mixed minor crop and this has given 80 lb. of sunnhemp seed per acre without affecting the main crop. Sunnhemp was sown as second crop in dry lands after the harvest of groundnut.

Greengram culture 62.—Greengram culture 62 was raised as a dry land crop over an area of 50 cents. The crop came up well in early stages but failed due to the sudden attack of leaf-spot disease.

Summer cultivation in rice fallows.—After the harvest of the paddy crop with the available facilities for irrigation, 15 acres were sown with groundnut TMV. 1 and groundnut TMV. 2, eight acres under cotton P.216., F. 0.25 acre under summer pumpkin, and 0.25 acre under short duration variety of tapioca. In the case of groundnut the adverse weather conditions in summer affected the crop and

it was attacked by 'surul' poochi and the yield became considerably low. Cotton was successful but it would have fared better with more irrigation. In the case of pumpkin and tapioca they were quite promising but for the severe drought which affected the yield. Temporary wells were dug and irrigation was given for the above crops.

Ragi.—Ragi Co. 2 was raised as a mixture with groundnut and cotton during summer. The performance was quite encouraging though the yield was below normal due to insufficient supply of water.

Vegetables.—Snake gourd, bendai, bitter gourd, brinjals and lab-lab were raised for production of seed.

Fruits.—The orchard was enclosed and seedlings of jack, lemons, lime and citron have been raised and potted in large numbers for sale to the ryots. The orchard area was extended and more number of seedlings are proposed to be distributed to the ryots, during 1952-53.

Green manures.—After the harvest of groundnut in rice fallows green manure crops like sunnhemp, daincha and sesbania were raised for the supply of green manure for the paddy crop. Daincha and sunnhemp were also raised for production of seeds. Sesbania was raised all round the kuruvai bunds for green manure and all round the samba and thaladi field bunds for the supply of seeds. The green manure seeds were also treated with bacterial culture to see their effects on the yields of green manure. The harvest is not yet complete.

II. Programme of work for 1952-53.

1. Paddy varietal trials will be continued to fix up suitable varieties for the tract.
2. Groundnut TMV. 1 and 2 and greengram culture 62 will be tried again in dry lands.
3. Trial of cotton, groundnuts and vegetables during summer in rice fallows will be carried on.
4. Ragi as a mixed crop with groundnut and cotton will be tried again.
5. Cultivation of green manure crops, sesbania for green manure and seed production will be pursued intensely.

The Agricultural Research Station, Pilicode (South Kanara district).

I. Results achieved during 1951-52.

Coconut.—(1) *Manurial experiments*—(a) *Method of application of manures.*—The experiment was started in 1948, the treatments consisting of applying the normal doses of manures for the coconut in (1) circular basins up to a radius of 8 feet round each tree, (2) applying the manures broadcast over the entire area and ploughing

in and (3) in linear trenches two feet wide and one foot deep dug in between rows of trees. No significant differences in yield of nuts have been observed so far due to the above treatments.

(b) *Comparison of potassic fertilizers for the coconut.*—This experiment is designed to find out whether ash could be effectively replaced either by potassium sulphate, or muriate of potash. The experimental trees received potassium sulphate, muriate of potash and ash to supply one pound of potash (K₂O) per tree, per year, and it is too early to draw inferences.

(2) *Cultural experiments*—(a) *Ploughing versus digging.*—The experiment was started in 1942 to find out whether digging coconut garden once in August-September is better than ploughing the garden and also to find out the optimum number of ploughings required to get economic yields. The yield data of the trees on analysis have not shown significant differences due to treatments.

(b) *Depth of cultivation.*—The experiment started in 1948 consists of the following treatments, (1) Digging the soil 5 inches deep, (2) ploughing the garden 4 inches deep with monsoon plough and (3) ploughing the garden 6 inches deep with Victory plough. Differences in yield or other palm characters due to treatments have not been observed so far.

(3) *Trials to increase the humus content of the soil.*—Of the various crops tried as a green manure crop, *crotalaria striata*, a leguminous weed, is found to be the best for the coconut garden. *Glyricidia maculata* is found to thrive excellently well to supply enough green leaf for manuring. Growing of *gliricidia* plants was intensified during the year. A total of 3,000 rooted cuttings was planted along the borders of fields and boundary. *Peuraria phaseoloides* promises to be a good cover crop for the coconut gardens.

(4) *Subsidiary crop trials.*—Of the various crops raised in the shade of the coconut in replicated plots elephant yam was found to give the maximum gross return per acre. Turmeric, dry paddy, tapioca and pineapple are the other promising subsidiary crops.

Pepper vines were planted in June 1952, using coconut trees as standard for the first time. To start with the trial is confined to 100 trees. The performance will be observed.

Area under other subsidiary crops (bulk trials) was also increased during the year with a view to increase the revenue of the station. Tapioca, sweet potato, ragi, paddy, groundnut, castor, etc., were grown in non-experimental blocks at the station in between rows of coconut trees.

(5) *Coconut breeding.*—Production of Tall × Dwarf seed coconuts was intensified to the maximum possible extent. A total of 386 inflorescences of selected Tall mother parents was cross-pollinated with dwarf. Also 808 Tall × Dwarf pollinated nuts, pollinated in 1951 season, were harvested for raising seedlings for distribution.

(6) *Study of exotic varieties of coconut.*—Of various exotic varieties of coconut under study at the Station, Laccadive ordinary, Laccadive small, Andaman ordinary and Phillippines are observed to be promising economic varieties for propagation.

(7) *Coconut varieties suited for low-lying areas.*—Among the nine varieties of coconut planted in 1947 in the low-lying area at the station, Java, Fiji, Tall × Dwarf, Laccadive ordinary and Phillippines continue to exhibit better growth than the rest.

(8) *Inheritance study in the coconut.*—The left or right spiralled nature of the parent trees is not truly inherited by the progenies even among the selfed progenies.

(9) *Incidence of rhinoceros beetle.*—It is observed as in the previous year that the exotic varieties of palms are more susceptible to beetle attack than the West Coast Tall and other State varieties and that the incidence is maximum during the summer months of January-June and minimum in September.

(10) *Improvement or irrigation facility.*—A trial pit for a well was dug at this station during the year. Water was tapped at a depth of 35 feet below ground level. The pit was dug up to a total depth of 47 feet. It has 11 feet of water even during the hottest part of the year, May. The well, thus, assures good supply of water which would be utilized for raising irrigated crops during summer.

II. Programme of work for 1952-53.

The following items of work will be continued :—

- (1) Experiment to determine the method of application of manures.
- (2) Experiment to find out the possibility of replacing ash with potassic fertilizers.
- (3) Digging versus ploughing coconut gardens.
- (4) Depth of cultivation for coconut gardens.
- (5) Trial of subsidiary crops.
- (6) Study of exotic varieties suited for low-lying area.
- (7) Large scale production of Tall × Dwarf seednuts.
- (8) Large scale multiplication of gliricidia and sesbania and other suitable green manure shrubs.

The following fresh items of work will also be taken up :—

- (1) Trial with chilean nitrate on coconut.
- (2) Trial of cacao on a fairly large scale.
- (3) Planting of F. 2 progenies of Tall × Dwarf.
- (4) Raising of irrigated crops during summer utilizing the water made available in the well newly dug up at the station.

The Deep Water Rice Station, Pulla (West Godavari district).

I. Results achieved in research during 1951-52.

One variety from Siam T. 2205, and another from Burma, Akkulu and a few cross progenies were found to withstand 3 to 3½ feet of water from the very early stages of the crop. The trials are being continued.

From the study of crosses made to evolve a good quality Nallarlu which is red rice and coarse, but drought resistant, one culture N × 60 gave a very good yield of 3,400 lb. per acre. Certain short duration strains, e.g., PLR. 2, TKM. 3 were found to give good yield and were also found to be 10-15 days earlier than the local varieties thus escaping the water shortage at the fag end of the season.

II. Annual programme of work for 1952-53.

First crop.—(i) Study of varieties to find out the capacity to withstand submersion to different depths of water and to keep pace with the rise of water during first crop season June to December. Arranging trials in the neighbourhood with promising cultures and varieties.

(ii) Isolation of pure lines from varieties reputed to withstand submersion.

(iii) Continuation of study of the cross progenies between deep water varieties and local strains.

(iv) Crossing of some of the promising strains with deep water rice to introduce flood resistance into the local strains.

Second crop.—(i) Continuation of study to make further selection in Nallarlu a common variety in the Collair tract.

(ii) Study of short duration strains and yield trials in second crop season to find out their suitability for early harvest to escape water shortage.

(iii) Continuation of study of cross progenies between short duration strains for evolution of a high yielding short duration strain with good quality rice for the dalwa area.

The Agricultural Research Station, Samalkota (East Godavari district).

I. Results achieved in research during 1951-52.

Paddy—(i) *Types.*—Several types comprising mostly strains of other stations were kept under study. Besides providing basic breeding material for the several breeding problems, these types have been furnishing valuable information regarding their performance from season to season in comparison with the local strains.

(ii) *Dry paddy.*—Buddma culture 130 and Jilama culture 459 once again recorded higher yields than MTU. 17 and MTU. 18. The seed was multiplied and distributed for trials in the district.

(iii) *First crop paddy*.—The superiority of the station strain SLO. 9 was established in a comparative yield trial of the Rasangi cultures compared with SLO. 15 (standard) for yield G.T. 5, and cultures compared with SLO. 15 (standard) for yield G.T. 5, and G.T. 9 were observed to record higher yields than the standard. Culture No. 10199 was resistant to stemborer attack.

The experiment with the object of utilizing the Godavari water to the best advantage by raising three crops of paddy in the double cropped wet lands and two crops in the single crop wet lands was continued during the year. Iswarikora alone among the early duration paddy in the main crop season withstood the adverse effects of the *Tirupugali* and the resulting heavy infestation of stem borer. The third crop, following, was a failure owing to the premature cut in the supply of water in the Godavari irrigation from the second week of March.

With a view to advance the planting season in paddy to overcome the uncertainty in the supply of water in the latter stages of crop growth, several types and cultures of Iswarikorra Pishanam crosses were grown. MTU. 15 and MTU. 9 and SLO. 12 grown in another trial escaped the borer attack and recorded fairly high yields.

(iv) *Second crop paddy*.—Second crop paddy was a complete failure owing to the scarcity of water for irrigation felt from the middle of March. The extreme drought conditions revealed the intrinsic quality of drought resistance in MTU. 15. Among the five varieties compared for yield culture NX. 60 recorded higher yields over the control SLO. 16. In another experiment the performance of seedlings of MTU. 15 and SLO. 12 raised from wet and dry nurseries was compared. Wet nursery seedlings were observed to be good, and preferable to secure better results.

(v) *Crop weather study*.—The study of influence of the weather on the growth, incidence of pests, and yield of crop was continued on paddy in both the seasons. SLO. 15 during the main crop season and MTU 15 during the second crop season recorded high yield over SLO. 13 and SLO. 12, respectively.

(vi) *Other crops*.—In the nightsoil compost experiment of Bananas the crop treated with farmyard manure, yielded good-sized bunches. The yield of the crop in this treatment was also the highest. Among the several wheat strains grown, the glumed wheat of Bellary was found to be suitable to local climate and soil. Broadcast crop of wheat recorded higher yield over the transplanted wheat; early sowing is associated with high yield. The gingelly strain TMV. 3 proved its superiority over TMV. 1 and the local. The bunch variety of groundnut (TMV. 2) was grown as an after-crop following paddy. A seed rate of 150 lb. per acre was observed to be optimum under Samalkot conditions.

Several Asiatic cotton varieties were grown to find out their suitability. Madras Uganda 1 closely followed by 216 F. were found

to be the best of the lot and recorded 640 lb. and 550 lb. of kapas respectively per acre. In the time of sowing *cum* manurial experiment with 215 F. it was observed that the crop sown early in November and manured well-recorded higher yield over the late sown and unmanured crop.

The cultivation of *Sesbania* along field bunds and *Gliricidia* along road sides and boundaries of the farm was done on an extensive scale.

II. Programme of work for 1952-53.

Paddy.—(1) *Types*.—The performance of the types will be studied as in previous years.

(2) *Dry paddy*.—The seed of BC. 130 and JC. 459 will be multiplied for supply of seeds to the districts.

(3) *Paddy first crop*.—The comparison of the Rasangi and Basangi duration Krishnakatukalu cultures will be pursued with MTU 3 as control instead of SLO. 1 and SLO. 2 respectively. The comparison of the promising MTU. 5 × MTU. 10 cross progenies will be continued during the next season. The trial of the MTU. 19 × SLO. 17 and SLO. 8 cross progenies will be pursued.

In addition the co-ordinated set of permanent manurial experiments will be conducted during the coming years commencing from the main crop season of 1952-53.

The experiments in connection with the utilization of Godavari water to the best advantage of raising three crops in the double-crop wet lands and two crops in a single-crop wet lands will be continued with slight modification, suggested by the Paddy Specialist.

(4) *Second crop paddy*.—The cultivation of second crop paddy in all the types and experiments advancing the time of planting will be pursued on the same lines as before.

(5) *Pulses*.—Yield trials and multiplication of promising cultures of green and blackgram will be taken up.

(6) *Oil seeds*.—The cultivation of groundnut as an after crop to paddy will be continued. The two strains of gingelly will be tried.

(7) *Cotton*.—The trials with all the Asiatic types of cotton and the several experiments suggested by the Cotton Specialist, will be laid out.

(8) *Green manures*.—The cultivation of *Sesbania* and *Gliricidia* on the station will be intensified.

The Agricultural Research Station, Siruguppa (Bellary district).

I. Results achieved in research during 1951-52.

Object.—The station was started with the object of studying the effect of irrigation water on movement of sale in soils of the Tungabhadra Project area and for determining suitable crops, cropping systems and cultivation methods suitable to the Project area.

The fundamental studies on the physio-chemical reactions of the black soils under irrigation were continued. The results are in conformity with the findings of the previous years, viz., that salts do not rise up as a result of light or heavy irrigation or the rotation of cropping adopted and that soil moisture increase with depth and no rise of water table takes place.

Agronomic studies.—The results of cultivating crops in the early and late seasons are given below :—

Crop.	Average yield (lb.) per acre.	Maximum yield (lb.) per acre—obtained in one field.
Jonna (Co. 9)	1,504	1,731
Korra (N 1)	1,233	1,233
Ragi	1,188	1,188
Maize	1,196 (cos)	1,196 (cos)
Fodder Jonna	10,024	13,198
Groundnut Bunch	643	1,000
Redgram	278	476
Groundnut (spreading)	589	589
Redgram (pure)	385	385
Paddy (GEB. 24)	2,742	4,527
Paddy (AKP. 2)	3,663	3,943
Cotton (H.A. 11)	642	778
Wheat (glumed)	1,186	1,890
Sugarcane	21.9 tons.	31.5 tons.
Onion	11,154	11,154
Gram	300	400

Crops—Paddy.—In the project area paddy varieties suitable for cold weather (October to February) and summer (February-May) seasons have to be determined. Among late varieties Co. 2, and ASD. 5, and ADT. 13 among early varieties were found promising for the cold weather season. For the summer season, ADT 18 and Co. 13 have given the highest yields among several varieties tried.

In paddy manurial trials, an application of 75 lb. of Ammonium Sulphate plus 200 lb. of groundnut cake plus 1½ cwt. of Superphosphate to cover a dressing of 5,000 lb. green leaf gave the best yield.

Rotation experiments.—The three course rotation was in the second year of trial. The four course rotation was completed and the indications are that the following rotation is the most economical in both shallow and deep soils :—

First year—Green Manure followed by wheat.

Second year—Groundnut-redgram mixture.

Third year—Jonna.

Fourth year—Cotton.

Millets.—Among sorghum T. 1 in the late season and Tenkasi Sorghum culture 8378, in early season were promising. In ragi, K.1 and Co. 4 were as good as Karunsurattai ragi tried. In Korra manurial trials, 60 lb. N application has given high yield.

Other crops.—TMV 2 and 3 groundnut strains and MA2 cotton were found suitable.

Miscellaneous.—The cholam fly pest incidence could be got over by thick sowing and subsequent thinning as conditions permit. Onion thrips could be controlled by syringing BHC. at 0.1 per cent strength. The following quantities of seeds were distributed :—

	LB.		LB.
Paddy	8,315	Bengal gram	1,200
Millets	12,375	Sesbania	25
Wheat	1,394	Vegetable (Tomato)	10
Cotton (MA 2)	2,500		
Cotton (H.A. 11)	,,		

Bagawadi Farm.—The main crops jonna, korra, cotton, wheat, groundnut and redgram were raised under irrigation adopting the methods practised on the Agricultural Research Station, Siruguppa. The ryots of the farm area, have taken up the practice of raising green manure crops. The high yield obtained from all crops raised have greatly impressed the ryots regarding the benefit of irrigation to dry crops.

II. Programme of work for 1952-53.

Fundamental studies on the physio-chemical reactions of black soils to light and heavy irrigations will be continued.

Trial of paddy, millets, cotton, groundnut, gingelly, wheat, sugarcane, pulses and vegetables in early and late seasons in the black soils under irrigation, will be continued.

The paddy manurial and rotation experiments will be continued.

Breeding work in cotton and millets will be continued.

The Agricultural Research Station, Taliparamba (Malabar district).

I. Results achieved in research during 1951-52.

Pepper.—The research on pepper partly financed by the Indian Council of Agricultural Research was taken up at this station, pending selection of a suitable site. The observation that among the cultivated varieties of pepper hermaphrodite forms are the most productive and the fact that hermaphroditism varies considerably from variety to variety, has brought out the imperative need for selecting forms of pepper with a high degree of hermaphroditism for distribution to pepper growers. In pepper, there are male and female forms also. Many a pepper garden in Malabar is found to be a failure because they are planted with unproductive male or female forms only. Therefore availability of suitable material for planting is a serious problem for pepper growers in South India, at the present time. It shows how the industry stands in great need of assistance from the State in the matter of providing it with scientifically selected planting material.

Paddy.—It has been demonstrated that green manure can remarkably increase yield of paddy by growing a crop of sunnhemp in wet land prior to the paddy crop. The average yield of paddy at the station was increased from 1,500 lb. to 2,420 lb. per acre by adopting this method.

The year's first prize in the crop competition held in Chirakkal taluk was won by the Agricultural Research Station, Taliparamba, with an yield of 4,243 lb. per acre.

Chillies.—A comparative trial on yield of chilli varieties indicate that the South Malabar variety is the most productive for the region. Confirmatory tests are still in progress.

Fruits—Mango.—Conclusive results were obtained for the mango top working-trial indicating that the months from July to October are better suited for top-working by insertion method and period from June to October for frame-working.

Jack.—Conclusive results were obtained for the inarching indicating that the optimum period for inarching on all the three-rootstocks, viz., A. Hirsuta, Rudrakshi and jack seedlings, is roughly from June to August.

Miscellaneous.—Trials with cotton, ginger and tapioca varieties are in progress. Silage making was done to demonstrate the method of preserving green fodder.

The following seeds and seed material were supplied to the public :—

Vegetable seeds	224 lb.
Fruit plants	16,342 (numbers).

II. Programme of work for 1952-53.

Paddy.—(a) Multiplication of seeds of the following strains and varieties of paddy for distribution to ryots :—

1 Ptb. 8	4 Krumkayama
2 Ptb. 9	5 Rajakayama
3 Ptb. 13	

(b) A comparative trial of the following strains will be conducted :—

1 Ptb. 8	4 Mtu. 3
2 Ptb. 9	5 Mtu. 4
3 Ptb. 13	6 Krumkayama

Pepper.—(1) Further observations on the 800 and odd marked vines of different varieties at the Agricultural Research Station, Taliparamba, will be continued.

(2) Confirmatory studies on pollination in pepper.

(3) Layout of the new pepper research station at Panniyoor

(4) Layout of the following experiments at the new pepper research station.

(a) Varietal collections.

(b) Cultural experiments.

(c) Plots for the study of spike-shedding in pepper and their control by use of proprietary hormones.

(5) Marking and observing the vines showing field resistance to " Pollu " and wilt diseases.

(6) Observation on the experiments already planted.

Green manures.—*Sesbania speciosa* and *gliricidia* will be grown wherever possible.

Varietal collections of fruit trees.—The study of performance of individual trees in the varietal collections in respect of yield and fruit quality will be continued and promising types will be multiplied through vegetative propagation.

Sapota root-stock trial.—Observation on the performance of different root-stocks employed for sapota.

Pineapple hormone trial.—Trials to induce early flowering and delayed flowering in pineapple by the application of hormones will be initiated and the effect of same will be studied as per approved programme.

Jack hybridization.—This will be continued in breadfruit and jack as per approved programme.

The Agricultural Research Station, Tindivanam (South Arcot district).

I. Results achieved in research during 1951-52.

(1) **Research—(A) Groundnut.**—Three bunch and two spreading strains of other Indian States that were tried did not prove better trial, six outyielded the controls. Seven out of the 11 big seeded edible types under preliminary yield trials proved high yielders. Based on yield and quality factors 23 and 55 selections under seed multiplication, have been advanced to rigid yield trials. About 108 selections were under row tests, of these 45 appear promising. About 24 new crosses were attempted and the progenies of earlier crosses were raised. After individual plant study 24 selections were isolated. About 54 exotic varieties received last year and nine and 235 single plant selections were made. About 28 new varieties received during the year were raised and studied in detail and 235 single-plant selections were made. About 28 new varieties received late in the year were sown under irrigated conditions. In the cultural experiment the results were not conclusive. Differences in the yield of groundnut following groundnut and groundnut following cereals in the rotation experiment were not statistically significant but cereals following groundnut gave significantly higher yield than cereals following cereals. In the manurial experiment, combinations of cattle manure and superphosphate have given increased yield. In the groundnut, cotton mixed cropping experiment, sowing of cotton at the time of first hoeing and weeding, groundnut

was found to be unsuited to the tract when compared with the simultaneous sowings of both the crops. Work on irrigated (summer) groundnut was intensified during the year both at this station and at Palur and experiments to determine (1) the best selections suited to this season, (ii) frequency of irrigations required and (iii) the economics of groundnut—*Ragi* and groundnut—cotton mixtures were in progress.

(B) *Gingelly*.—The crop raised during the cold weather season (December—February 1952) was a complete failure. The main crop was raised during the summer season (March 1952 to July 1952) under irrigation. Two selections and four colour types isolated from TMV 1 strain were under comparative yield trial and two strains from other States and four selections were under preliminary yield test. A total of 115 selections are under different stages of row tests and purification. Nine new crosses were attempted and the progenies of earlier crosses were raised for further study. In the experiment laid out to find out the economic spacing to be adopted for summer sowings, 1 foot by 1 foot appears best.

(C) *Castor*.—Eight selections from progenies of crosses were compared with the standard strain and were found to be on a par with it in yield but are definitely shorter in duration by about a month. A very short duration ($4\frac{1}{2}$ months) variety from South Africa was found to be by far inferior to the local strain in the matter of yield. But its short duration and a few other economic characters are being utilized in breeding work. Four of the 14 selections under preliminary yield test proved superior to the control. About 92 selections were under purity study and 37 of these have been selected for yield trial. Six new crosses were attempted and the progenies of earlier crosses were raised and studied in detail and 30 single plant selections have been made. Outstanding high yielding single plants of three strains were under observation for maintaining vigour and purity of the strains.

(2) *Miscellaneous*.—Perennial fodder grasses, viz., Napier grass, Guinea grass, Thin Napier grass, and water grass were maintained and planting material of these supplied to the public. Fodder cholam and paddy was raised on a larger area than in previous years with a view to increase the revenue and also to make the station self-sufficient in the matter of fodder requirements. Vegetables like cow-pea, *bendai* gourds, lab-lab, etc., were grown and 38 lb. of seeds were for distribution. *Gliricidia* and *Sesbania* were raised on a large scale and planting material of these distributed to the public.

(3) *Seed distribution*.—The following quantities of improved oil seed strains were distributed:—

	LB.
Groundnut	.. .. .
Gingelly	 35,003
Castor	 1,325
	 2,724

II. Programme of work for the year 1952-53.

(A) *Groundnut*—(a) *Rainfed*.—(1) Study of new varieties, types and selection work.

- (2) Hybridization.
- (3) Manurial experiment.
- (4) Cultural experiment.
- (5) Rotation experiment.
- (6) Mixed cropping of groundnut and cotton.
- (7) Vegetative propagation of groundnut.
- (8) Sowing groundnut as pods versus kernels.
- (9) Breaking dormancy of spreading groundnut.
- (10) Harvesting and curing trials.
- (11) Mechanical cultivation of groundnut.

- (b) *Summer*.—(1) Comparative yield trials.
- (2) Mixed cropping of ragi, cotton and groundnut.
- (3) Irrigation experiment.
- (4) Spacing trials.

(B) *Gingelly*—(a) *Summer* 1953.—(1) Selection work.

- (2) Spacing trials.
- (3) Hybridization to evolve new economic forms and cosmopolitan types.

(b) *Cold weather* (1952-53).—(1) Selection work.

- (2) Maintenance of varieties and types.
- (3) Spacing trials.
- (4) Gingelly storage experiment.

(C) *Castor*.—(1) Selection work.

- (2) Purity studies.
- (3) Hybridization to evolve new economic forms.
- (4) Maintenance of inbred types.
- (5) Maintenance of vigour and purity of strains.

(D) *Miscellaneous*.—(1) Vegetables—Seed multiplication.

- (2) Cultivation of green manure crops.
- (3) Cultivation of fodder crops.
- (4) Raising of selected coconut seedlings.
- (5) Large scale spraying and dusting trials on groundnut.
- (6) Maintenance of fruit-trees.

The Rice Research Station, Tirurkuppam (Chingleput district).

I. Results achieved in research during 1951-52.

Pure line selection.—One culture 9857 in Mottakar is proposed to be issued as TKM.5 since it had done well both on the station and district. In the *Swarnavari* season, a few cultures were found to be better than TKM 3. *Swarnavari*. In the *Samba* season there was a severe drought and the results of trials were rendered inconclusive.

Two period and season bound cross progenies with good quality rice were found to be yielding higher than TKM.3. District trials will be conducted during the 1952 Swarnavari season. In the crosses between a Burma type and Co.10 some progenies withstood lodging, compared to the Swarnavari variety.

Agronomical experiments.—In the single-crop wet land, night-soil compost was found to be the best followed by farmyard manure in both grain and straw yields at 60 lb. nitrogen dose. It was found that phosphates applied to the green manure crop preceding paddy tended to have better response than phosphate applied direct to paddy.

Mixed cropping of Madras Uganda 1 cotton with rainfed paddy was encouraging, the acre yield of cotton being 460 lb. of kapas for cotton sown 8 feet apart. Cotton in the rice fallows had too much vegetation and not much bolling. Groundnut crops was fairly successful.

II. Annual programme of work for 1952-53.

I. *Pure-line selection.*—(i) Continuation of yield trials of cultures of Swarnavari in Swarnavari season.

(ii) Continuation of yield trials of cultures of Sirumani, Vadan Samba, Chinna Samba and Kittan Samba during the Samba season.

(iii) Trial of cultures of dry paddy varieties, Sambalai and Bairivadlu.

(iv) Continuation of trials of Vellakar, Kappakar, Pullasanavadlu in the Navarai season.

II. *Hybridization.*—(i) Yield trials of better quality Swarnavari cross progenies.

(ii) Yield trials of cross progenies for evolution of a strain with stiff straw and short duration character.

(iii) Continuation of yield trials of cross progenies of wild rices cultivated paddy varieties.

(iv) Continuation of trials for evolution of 'dormant' short duration strains in the Swarnavari season.

(v) Evolution of shorter duration—Vadan Samba.

III. *Agronomic trials.*—(i) Methods of green manuring broadcast paddy.

(ii) Direct application of phosphate (P₂O₅) to rice versus its application to the green manure crop preceding it.

(iii) Testing of efficacy of acidulated phosphate compared to super.

(iv) Experiments with farmyard manure and municipal rubbish compost at 60 lb. N.

(iv) Growing of M.U.I. cotton, one row every 8 feet, in dry paddy.

(vi) Demonstration of methods for self-sufficiency of green manure.

(vii) Growing cotton and groundnut in rice fallows.

VIII. CROP SAMPLING (CROP-CUTTING EXPERIMENTS).

In continuation of the Five-year Co-ordinated Scheme commenced in 1950-51, crop cutting experiments were conducted in 1951-52 for estimating the production of the following crops:—
Major Food Crops, viz., (i) paddy, (ii) cholam; (iii) cumbu; (iv) ragi; and principal oil seed crops, viz., (v) castor; (vi) gingelly and (vii) groundnut. The survey for estimating the additional production due to the application of the principal Grow More Food Aids, viz., improved paddy seeds, ammonium sulphate and green manure seeds was also continued this year.

2. The summary of the results from the crop cutting experiments conducted under these three categories is given in the following paragraphs.

CATEGORY I—MAJOR FOOD CROPS.

3. *Paddy.*—Unlike in the previous years, the fasli year 1951-52 was divided for the first time into three seasons for the paddy crop. The seasons are (i) from the 1st of July to the end of October; (ii) from the 1st of November to the end of March; and (iii) from the 1st of April to the end of June. The number of villages for experiments allocated to the seasons varied in proportion to the area under paddy harvested during the seasons. The purpose of thus defining the seasons was to bring them in general conformity with seasons of the three distinct crops like Kar or Kuruvai, Samba or Pishnan and Navarai respectively raised during these seasons.

4. For the first period, paddy crop 376 experiments at the rate of two experiments per village in 188 villages were planned and of which only 348 were completed satisfactorily. The number of experiments planned for the second period was 1,952 of which 1,823 experiments were completed. For the third period 190 experiments were completed as against 212 experiments planned. Thus in all the three periods taken together 2,361 experiments were completed as against 2,540 planned. The reason for the loss of 179 experiments was mainly that paddy lands in many of the districts were laid fallow on account of failure of rains. As usual a small number of the experiments were lost also due to ryots harvesting away the crop in the selected fields without giving notice required of them to the field staff.

5. Results of the analysis carried out in detail for the completed experiments on the first and second period crops are given respectively in the Appendices XV (a) and (b). The average yield of rice for the State as a whole of the first period crop and its standard error are 989.9 lb. per acre and 2.4 per cent and the average yield and its standard error of the second period paddy are 1,015.0 lb. per acre and 2.0 per cent respectively. Results of the combined analysis of the first and second period paddy are given in the Appendix XV (c) from which average yield may be seen to be

969 lb. per acre and its standard error is 1.6 per cent. An attempt at the simple analysis of the results of the crop as per Appendix XV (d) however goes to show that the average yield tends to be 1,155.76 lb. per acre. The total production of rice as estimated by random Sampling Survey is 41,01,000 tons as against 4,021,000 tons estimated in the final forecast, the following being in excess by about 2 per cent.

6. *Millets*.—Unlike in the previous year, crop cutting survey on millets was not a complete failure though the number of completed experiments still fell far short of the number planned. As against 4,536 experiments planned for millets only 1,946 experiments were completed satisfactorily. The number of experiments planned and the number completed under each of the millets are given below :—

Crops.	Number of experiments planned.	Number of experiments completed.
Rainfed cholam	1,622	663
Irrigated cholam	314	116
Rainfed cumbu	1,340	549
Irrigated cumbu	200	93
Rainfed ragi	392	133
Irrigated ragi	668	392
Total ..	4,536	1,946

Apart from the natural causes, the loss of such a large number of experiments was chiefly due to lack of adequate interest on the part of the Revenue Subordinates for various reasons.

7. While the statistical analysis is completed in detail for unirrigated cholam and unirrigated cumbu, it is in progress for unirrigated ragi, irrigated cholam, irrigated cumbu and irrigated ragi. A simple analysis was however attempted in the case of the later group of crops for the purpose of this note.

8. *Unirrigated Cholam*.—From the table in Appendix XV (c) it can be seen that the average yield per acre and its standard error are respectively 379.7 lb. and 4.4 per cent. Production estimates for districts and for the State as a whole are not worked out at this stage for want of final figures of districtwise and talukwise acreage under the crop in 1951-52. They will, however, be worked out in November 1952 when acreage figures are expected to be available.

9. *Unirrigated Cumbu*.—It will be seen from the table in Appendix XV (f) that average yield for this crop and its standard error are estimated at 311.3 lb. and 5.6 per cent respectively. Production estimates for this crop also have not been calculated

at this stage for the same reasons as given above for unirrigated cholam.

10. For unirrigated ragi, irrigated cholam, irrigated cumbu and irrigated ragi, the average per acre is 500.94 lb., 910.50 lb., 795.37 lb. and 987.5 lb., respectively as will be seen from the tables in the Appendices XV (g), (h), (i) and (j).

CATEGORY II—OIL SEEDS CROPS.

11. The crop cutting surveys on oil seeds include two pilot surveys, one on Castor conducted in Anantapur district and the other on gingelly conducted in East Godavari district and State wide survey on groundnut conducted during the year. The number of experiments completed during the year under each of these surveys as against the number planned is as follows :—

Crop.	Number planned.	Number completed.
Castor	186	180
Gingelly	162	154
Groundnut	1,514	1,358
	1,862	1,692

12. Statistical analysis of the results of these surveys is being conducted by the Indian Council of Agricultural Research themselves under the conditions of the scheme for survey of oil seeds. Results of the analysis have not yet been communicated by the Indian Council of Agricultural Research. Statistical analysis will, however, be undertaken by the State Statistical Staff later in the year when they will be comparatively free for this work.

CATEGORY III—STATISTICAL ASSESSMENT OF ADDITIONAL PRODUCTION DUE TO GROW MORE FOOD AIDS.

13. The three principal, Grow More Food Aids considered for the survey were improved paddy seed, green manure and ammonium sulphate as in the previous year. While experiments on seed and green manure were conducted at one stage, experiments on ammonium sulphate were conducted both at pre-manuring and post-manuring stages—

Category.	Number of experiments planned.	Considered for analysis.
Seed	436	370
Green manure	344	296
Pre-manuring (ammonium sulphate) ..	352	273
Post-manuring (do.) ..	352	279

As the survey was planned to give results for the State as a whole, details of rate of yield by districts have not been considered. The analysis is brought out in the table in the appendix 15 (k).

As can be seen from the table the rates of response are estimated at 191.73 lb. in rice per acre due to improved seed, 231.6 lb. per acre due to green manure, 288.5 lb. per acre due to ammonium sulphate applied at pre-manuring stage and 220.9 lb. per acre due to the fertilizer applied at the post-manuring stage.

IX. SOIL CONSERVATION.

Soil Conservation Scheme in Rayalaseema.—The scheme for soil conservation, sanction in G.O. Ms. No. 304, Development, dated 24th January 1949, is now in its third year of working. The work first commenced on 8th August 1949. The scheme could not make much headway during the first and second years owing to several formalities that had to be gone through, as prescribed in the Madras Land Improvement Schemes Act, 1949, before taking up the actual execution of several soil conservation measures. Topographic survey was completed in all the three centres on a catchment basis, and plans and estimates drawn up on catchment basis were submitted. The details of progress made during the period under report is given below:—

District.	Centre.	Area bunded previously up to 30.6.51 (acres).	Area bunded during the year (acres).	Total area bunded up to 30th June 1952 (acres).	Area trenched previously (acres).	Area trenched during the year (acres).	Total area trenched up to 30th June 1952.
Bellary ..	(Hagari) ..	24	891	915	21	57	78
	(Alur) ..	650	1,390	2,040	..	..	..
Anantapur	(Guntakal)	200	1,215	1,415	..	..	..
		874	3,496	4,370	21	57	78

In addition to contour bunding, other conservation measures such as contour trenching and afforestation of steep slopes and barren hillocks, construction of waste weirs, turfing, contour bunds and near waste weirs for giving a good binding effect with grasses like *Cenchrus Ciliaris*, *Isolema laxum*, Blue panic, etc., were also carried out during the period under report. Technical assistance on the suitable soil conservation measures to be adopted (in their lands) was given by the staff to private bodies like the Doddaghatta Co-operative Colonization Scheme and to some enthusiastic ryots. Some of the ryots and co-operative societies' lands were surveyed and actual positions of bunds were lock spitted in their fields (for their execution) during the year.

2. *Soil Conservation Scheme for Nilgiris.*—The scheme for soil conservation was started in Ootacamund during the year and the preliminary survey work was completed in the Ketty Valley and plans and estimates submitted by the Assistant Agricultural Engineer, Ootacamund, were submitted to Government for sanction.

The scheme for soil conservation research for Nilgiris was submitted to Government for final approval of Indian Council of Agricultural Research.

3. *Famine Relief Works.*—The Board of Revenue suggested to Government that soil conservation schemes particularly contour-bunding will be an ideal famine relief measure and Government directed the Assistant Agricultural Engineer, Bellary, to draw up a scheme for the badly affected areas of Chittoor district. Accordingly a scheme for soil conservation with contour-bunding as its main feature was drawn up for Chittoor district as a famine relief measure. The scheme was sanctioned in G.O. Ms. No. 13, Revenue (Famine Relief), dated 7th May 1952. The Assistant Agricultural Engineer, Soil Conservation Scheme, Ootacamund, was in additional charge and an area of 17 acres, out of the proposed area of 7,500 acres were contour-bunded up to end of June 1952.

As desired by the Commissioner of Food Production, another scheme for soil conservation particularly for the dry and wind-swept areas of Coimbatore district and Palani taluk (in Madurai district) was investigated and submitted during the year. This scheme was also formulated as a famine relief measure.

4. *State Soil Conservation Board.*—The 12-member State Soil Conservation Board constituted for co-ordinating all the work in the State concerning soil conservation and land utilization was further expanded to include the Secretary to Government (Development Department) and Chief Engineer, Electricity, is to be co-opted whenever there is necessity. The Assistant Agricultural Engineer, Soil Conservation Scheme, Bellary, was ordered to be the Secretary to the Board until the State Soil Conservation Officer is appointed.

During the year under report the Board's second meeting was held at Bellary on 15th October 1951 and the third meeting at Ootacamund on 19th May 1952, and both the meetings were presided over by the Minister for Agriculture. In the two meetings, several schemes to be taken up in the State for soil conservation and land utilization were discussed, in addition to the review of the schemes that are in progress. The Board has in general accepted the several schemes to be taken up in the State and recommended to the State Government for the early implementation of the Schemes.

X. THE TUNGABHADRA PROJECT.

1. *The Agricultural Research Station, Siruguppa.*—The Station was started with the object of studying the effect of irrigation water on movement of salt in soils of the Tungabhadra Project area and for deciding suitable crops, rotations and cultivation methods suitable to the Project area.

The fundamental studies on the physio-chemical reactions of the black soils under irrigation were continued. The results are in conformity with the findings of the previous years, viz., that salts do not rise up as a result of light or heavy irrigation and the

rotation of cropping adopted and that soil moisture increases with depth and no rise of water table takes place.

Agronomic studies.—The yield of crops in the early and late seasons is given below :—

Crop.	Average yield (lb.) per acre.	Maximum yield (lb.) per acre.
Jonna (Co I)	1,504	1,731
Korra (N 1)	1,233	1,233
Ragi	1,188	1,188
Maize	1,196 lb. (Cobs)	1,196 (cobs)
Fodder Jonna	10,024	13,198
Groundnut bunch	643	1,000
Redgram	278	476
Groundnut (spreading)	589	589
Redgram (pure)	385	385
Paddy (GEB 2)	2,742	4,527
Paddy (AKP 2)	3,663	3,943
Cotton (HA 11)	642	778
Wheat (gumed)	1,186	1,890
Sugarcane	21.9 (tons) cane	31.5 tons.
Onion	11,154	11,154
Gram	300	400

Crops—Paddy.—In the Project area, paddy varieties suitable for cold weather (October to February) and summer (February-May) seasons are required. Among late varieties, Co.2 and ASD.5 and ADT 18 among early varieties were found promising for the cold weather season. For the summer season ADT 18 and Co. 13 have given the highest yield among several varieties tried.

In paddy manurial trials, an application of 75 lb. of ammonium sulphate plus 200 lb. of groundnut-cake plus $1\frac{1}{2}$ cwt. of superphosphate over a basal dressing of 5,000 lb. green leaf gave the best yield.

Rotation experiments.—The three-course rotation experiment is in the second year of trial. The four-course rotation was completed and the indications are that the following rotation is the most economical for both shallow and deep soils.

First year green manure followed by wheat.

Second year groundnut-redgram mixture.

Third year jonna.

Fourth year cotton.

Millets.—Among sorghum T-1 in the late season and Tenkasi Sorghus culture 8378, in the early season are promising. In ragi, K1 and Co.4 are as good as Karunsurattai ragi the standard. In Korra, manurial trial with 60 lb. N application has given high yield.

Other crops.—TMV 2 and 3 groundnut strains and MA2 cotton are found suitable.

Miscellaneous.—The cholam fly pest incidence could be got over by thick sowing and subsequent thinning as conditions permit. Onion thrips could be controlled by spraying BHC at 0.1 per cent strength. The following quantities of seed were distributed :—

	LB.
Paddy	8,315
Millets	12,375
Wheat	1,394
Cotton (M.A. 2) }	2,500
Do. (H.A. 11) }	
Bengalgram	1,200
Sesbania	25
Vegetable (Tomato)	10

2. *Bagawadi Farm.*—The main crops jonna, korra, cotton, wheat, groundnut and redgram were raised under irrigation adopting the methods practised on the Agricultural Research Station, Siruguppa. The ryots of the farm area are taking up the practice of raising green-manure crops. The high yield of all the crops raised has greatly impressed the ryots regarding the benefits of irrigating the dry crops.

3. Proposals are being formulated for supply of seeds, green manures and tractors for levelling land before irrigation water is made available next year. Government have sanctioned the opening of two demonstration farms of which one is to be located at Bhairadevanhalli where buildings of the Public Works Department are available for use.

XI. COLONISATION SCHEMES.

The colonisation schemes at Araku and Wynaad were continued.

(a) ARAKU VALLEY SCHEME.

* 1. *Research—Paddy.*—Paddy varieties Ninnidhan local variety and S.R. 26 B did well in varietal trials. Mass selection was practised in Ninnidhan found to be free from blast disease. In the second-crop season, S.L.O. 12 followed by MTU 15 are good yielders. Mass selected Battadhan, local dry paddy variety, was found promising for rainfed conditions.

Ragi.—The mass selected local varieties jagarla mandya and Mudaimuscal did very well.

Samai.—Mass selected Pedda samai yielded better than local.

Other crops.—Among sweet potato varieties tried Triumph and Ranger did well. Sugarcane (Co. 419) gave 48 tons of cane per acre. Plantains (Bontha) gave an acre yield of 4,000 lb. fruits under rainfed conditions. Kasigogu gave very good yield of fiber (1,722 lb.) per acre. Several varieties of vegetables were grown and seeds collected.

Fruits.—The following varieties of fruits are found to do well :—

Sweet oranges—Sathgudi, Washington Navel, Malta Ruby and Teneriffe.

Acid lime—Kodur type.

Citron—Bengal.

Bananas—Amruthapani, Sirumalai and Bontha.

Grape fruit—Deccan, Poona and Special.

Guava—Lucknow 49.

Pomegranate—Michelpatti.

Grapes—Red Muscat.

Passion fruit—Purple fruited.

Tree tomato and Cape gooseberry.

2. *Extension work.*—Regular demonstration and propaganda among the villages in the valley was done. The following progress was made with tractor ploughing :—

Waste lands reclaimed	564 acres.
Improved seeds distributed—	
Paddy	2 tons 1,599 lb.
Ragi	1,734 "
Green-manure seeds	660 "
Vegetable seeds	2 "
Fruit plants	2,504 Nos.
Miscellaneous—	
Compost pit	500
Cattle manure (pit preservation)	1,581 } dug.
Agricultural implements (Nos.)	100 (plough shares)
Eggs of White Leghorns	42 (maminutties)
	781

Help was rendered to the hillmen to control soil erosion, pests and diseases affecting crops, compost making, etc., by the demonstration maistries.

(b) WYNAAD COLONY.

1. *Research—Paddy.*—Variety S.R. 26 B was found to be promising medium duration type. SLO. 17, MTU 19, Palthondi 9114, Marathondi 8748 and Velumpala 8393 were under district trials and are promising. In the second crop season, Vella Puncha gave the highest yield as broadcast crop.

Fruits.—Malta lemon, Seville lemon, Pine apples, passion fruits and Papaya are found useful for the colony area. Propagation methods are under trial.

Other crops.—In Ginger, larger (1,350 lb.) planting material was found to produce heavier yield (12,500 lb. per acre). In Tapioca planting the setts 2 feet apart, in row 3 feet apart and harvesting ten months after planting was found to produce heavy yield. Seeds of selected varieties and bittergourd and pumpkins were collected.

2. *Extension work.*—Propaganda and demonstration was carried out among the settlers in the colony, in respect of soil conservation, improved methods of cultivating crops and fruit plants, remedial measures to control pests and diseases, compost making, etc. The following progress was made :—

1 Soil conservation (contour bunds)	2,500 acres.
2 Transplanting of paddy instead of broadcasting (90 per cent of the area has been covered).	
3 Raising second crop of paddy	120 acres.
4 Green leaf manuring	500 "
5 Compost making	1,245 tons.
6 Seeds distributed—	
Paddy	56,639 lb.
Ragi	172 "
Pulses	477 "
Vegetables	110 "
Root crops	649 "
Cover crops	73 "
Fruit and other economic plants	20,000 (numbers).

XII. PROPAGANDA AND PUBLICITY (EXTENSION WORK).

Propaganda.—The agricultural extension staff concentrated their efforts on the integrated production plan consisting of intensive cultivation schemes, cotton extension schemes and sugarcane development scheme launched during the year. To intensify the work 100 additional Agricultural Demonstrators were employed in 100 taluks where work was heavy. The special staff for (i) intensive rural welfare work in selected firkas, (ii) intensive manuring in selected areas, (iii) development of sugarcane in selected areas, (iv) demonstration of control measures against pest and diseases and (v) cotton extension was contained during the year. Besides, extension work in fruits was started with the appointment of a Special Horticultural Assistant in Kodaikanal. There was progress in extension work relating to food crops, cotton, sugarcane, fruits and plant protection methods.

The district staff carried on propaganda for extension of improved cultural, varietal, manurial and irrigational practices under the integrated production plan. The extension staff constantly toured in their respective jurisdiction holding meetings and conducting demonstrations on the ryots' fields in the villages. In all 9,474 meetings were held by the district staff.

The staff was not able to visit the villages as often as necessary and contact as many ryots as possible. The non-official honorary propagandists appointed last year were continued but the

progress made was not satisfactory and the scheme was abolished. It was found that really good and progressive cultivators were not coming forward to serve as honorary propagandists for want of time.

The "Model Farmer" scheme was continued, one for each taluk. One old client of the department adopting all the improved practices recommended by the department, was selected and supplied with seeds, manures, etc., at concessional rate. The scheme was working successfully. The model farm, run by non-officials, served as an ocular demonstration for the cultivators in the neighbourhood.

The extension staff was relieved from direct sale of chemical manures and this work was entrusted to co-operative societies and private firms.

In a few select districts, the sale of improved seeds was entrusted to co-operative societies and the scheme is working satisfactorily.

Besides, in each taluk, one seed-farm ryot was selected to sell seed produced by him on commission basis and the system was working satisfactorily.

The "Barter" system of exchanging improved seed with local, to enable poor ryots who have no ready cash to buy, was found to work satisfactorily.

Publicity.—The Grow More Food journals, published monthly in regional languages, Mechichelvam (Tamil), Padipantalu (Telugu), Naveenakarshakan (Malayalam) and Krishikarabandu (Kannada) continued to be issued. The strength of subscribers at the end of the year under review was—

Mezhichelvam	51,042
Padipantalu	45,612
Naveenakarshakan	4,874
Krishikarabandu	5,291

The annual subscription for the journals was increased from Rs. 1-8-0 to Rs. 2-4-0 from 15th June 1952. The Villagers' Guide and Calendar for the year 1952 in four regional languages—Tamil, Telugu, Malayalam and Kanarese was published and distributed to the public. Ten leaflets on manurial trials, feeding the soil, budrot of coconuts in English and the four regional languages were published. Besides 8 booklets in popular language with attractive cover pages on rice, cotton, agricultural implements, sugarcane, turmeric, tapioca, sweet potato and millets were published.

Radio talks.—Radio talks, eighteen in all, on several subjects, such as green manuring, sugarcane, cotton, paddy, utilization of paddy field bunds, coconuts and its products were broadcast from the All-India Radio stations at Madras, Kozhikode, Vijayavada and Tiruchirappalli in English and in four regional languages.

Exhibition.—Exhibitions were organized in connexion with all important local festivals and during social, political and religious conferences, to give wide publicity to improved agricultural practices. On all these occasions, demonstrations on several agricultural improvements formed an important feature. Two hundred and one exhibitions were held during the year.

Field-scale demonstrations.—Propaganda and publicity alone are not enough to bring home to the ryots the benefits of improved practices as they are mostly illiterate. Ocular demonstrations are more convincing. During the year 6,644 demonstration plots were laid out to bring home to the cultivators the effects of improved seeds, manures and better cultural practices. Large-scale campaigns of remedial measures, to control insect pests and diseases were also organized with similar object.

Village Advisory Committees and Agricultural Associations were ordered and organized to help the rapid introduction of agricultural improvements over larger areas. This work is being pushed through with great intensity.

Food crops.—Extension work was mainly concentrated on stepping up production of food crops though in the integrated production plan, work on extension of cotton, jute and sugarcane has to receive attention. The production of improved seeds, particularly food crops, was increased in Agricultural Research stations. The following are the details :—

				Quantity of seed distributed.	Area covered. ACS.
1	Paddy	..	..	11,211	5,04,495
2	Millets	..	..	686	1,02,900
3	Pulses	..	..	65	19,396

Seed development work.—Improved seeds contribute additional production. In order to step up the multiplication of paddy, millets and pulses seeds and have control over purity and viability of seeds produced the Special Seed Development staff employed last year was continued. Adverse seasonal conditions and derationing of foodgrains greatly hindered procurement of required quantity of seed from seed farms. Due to the special efforts taken, there was gradual improvement in purity and viability of the seeds produced in seed farms (vide Appendix XI).

A scheme to induce cultivators to produce large quantity of improved seed by granting interest-free loans up to a maximum of Rs. 12,000 for paddy and Rs. 3,000 for millets was put into effect. Only Rs. 66,800 could be disbursed out of 11 lakhs of rupees sanctioned in the districts of East Godavari, Krishna, Tanjore, Nellore,

Madurai and Tirunelveli, due to introduction of scheme late in the season. The seed production details are furnished below :—

	Seed farms area in acres.		Quantity of seeds procured in		
	Primary.	Secondary.	Tons.	Lb.	
Paddy	6,433	39,969	16,700	306	Both the Primary and secondary seed farms are organized in cultivators' fields.
Milleta	4,685	8,111	619	641	
Pulses	91	168	2	494	

Oil seeds.—The following quantity of oil seeds was distributed in the districts for sale to ryots and for organizing seed farms from the departmental farms :—

	LB.	Area covered. ACS.
Groundnuts (pods)	35,325	3,532
Gingelly	1,325	442
Castor	4,137	414
Total ..	40,787	4,388

Besides, 163,390 seedlings of coconuts from selected nuts raised in the nine coconut nurseries were distributed to the public.

Cotton.—Due to shortage in cotton, cotton extension work received special attention. Cotton seeds of important strains were multiplied under five schemes and the following quantities were procured and distributed during the year :—

	Seed from acreage.	Quantity of seed procured in.		Area proposed to be covered.
		TONS.	LB.	
1 C-1. cotton (Guntur district) ..	800	in progress		..
2 W-1. cotton (Bellary) ..	6,500	Do.		..
3 881 F	600	8	670	572
4 K-2 cotton (Koilpatti) ..	30,000	250	..	20,000
5 Co 2 cotton (Tirupur) ..	4,480	111	1,360	10,000
6 Madras Uganda I (Koilpatti) ..	4,110	529	1,740	47,468
7 K-5 (Tiruppur)	13,000	100	..	8,000

Despite adverse season nearly 1,574 tons of improved seeds of all strains including P.216-F and H.420 got from Punjab and Madhya Pradesh were distributed to cover an area of 172,000 acres.

Fruits.—The extension staff arranged for the supply of seedlings, cuttings, budded and graft plants of fruit plants to fruit growers and the public from Government fruit nurseries and private nursery men. A Fruit Assistant appointed in Kodaikanal attended to horticultural survey of the District.

holdings arranged for the supply of 2,000 fruit plants. The following table shows the number of fruit plants and seeds supplied from Fruit Research stations and other fruit centres :—

	Number of fruit plants.	Quantity of seeds (lb.).
1 Government Fruit Nursery (Koduru).	12,029	..
2 Hill Fruit stations	20,328	48
3 College Orchard, Coimbatore ..	7,095	78
4 Fruit centres at Anakapalle, Wynad, Lam, Taliparamba and Araku.	50,456	1,760

Demonstration in fruit products and preservation.—Only one Lady Demonstrator remained in service with jurisdiction over South Arcot, North Arcot, Chittoor, Chingleput and Madras districts. The preparation and preservation of fruits, fruit products and vegetables were demonstrated in girls' schools and colleges, womens' clubs, women welfare centres, important exhibitions and fairs and in some private homes. These were accompanied by talks and were very popular. The following demonstrations were held during the year :—

Educational institutions	46
Exhibitions and fairs	25
Clubs, hostels and such other institutions	5
Private residences	25
Total ..	101

Sugarcane.—The Sugarcane development staff were mainly engaged in giving technical advice to cane growers and assisting them in securing improved seed material, manures, implements, etc. They laid out demonstration plots and helped in combating pests and diseases of sugarcane. The following items of improvement work were effected :—

1 Area covered with improved implements for preparatory tillage including ridging.	44,238 acres.
2 Area covered by green leaf and green manuring ..	14,193 ..
3 Area brought under proper drainage	19,917 ..
4 Area manured with optimum dose of concentrated manures.	35,343 ..
5 Area in which labour saving bullock drawn implements were used for inter-culture.	25,853 ..
6 Area wrapped and propped	10,328 ..
7 Demonstration of better methods of preparation of jaggery.	6,397 numbers.
8 Area harvested at optimum time	18,924 acres.
9 Composting of cane trash	3,660 numbers.
10 Construction of improved furnace for jaggery	2,751 numbers.

Fodder.—Since cattle form the backbone of agriculture, their proper feeding also received attention. Raising of fodder crops, annual and perennial, were demonstrated in several tracts. During the year, the following quantity of fodder crops were distributed:—

	Quantity distributed.		Average covered (acres).
	Tons.	lb.	
Fodder crop seeds (chola, maize pillipesara, lucerne).	207	598	16,146
Perennial grass (Napier, Guinea and others) slips (numbers).	619,700		124

With a view to encourage fodder cultivation, planting material was offered at concessional rate.

Vegetables.—Production of vegetables in villages and towns was encouraged to solve food shortage to some extent. Free distribution of vegetable seeds to schools and colonization societies were continued during the year, and an amount of Rs. 3,744 was spent on this account. In the Madras City, three Special Agricultural Demonstrators did propaganda for vegetable production in backyards and bungalow compounds. Over 4,854 kitchen gardens were visited and demonstrations on cultural, varietal and manurial aspects given. A total quantity of 6,001 lb. of vegetable seeds and 70,029 vegetable seedlings were distributed to the public during the year.

Subsidiary food crops.—To encourage the cultivation of subsidiary food crops such as tapioca and sweet potato, seed materials for planting were distributed free and an amount of Rs. 9,281 was spent for the purpose in 1951-52. Details of cultivation of tapioca were published in the Grow More Food journals.

Manures.—Full potentialities of improved seed and provision of irrigation facilities are realized only by keeping up the fertility of the soil through manuring. Hence, intensive propaganda was done for better manuring.

Cattle manure.—Cattle manure is unquestionably the best but it is not properly preserved by ryots and propaganda and demonstration on proper preservation of cattle manure was continued. The following are the achievements of the year.

1 Manure pits newly opened for proper storage of cattle manure.	98,358
2 Byre's system for conservation of urine ..	35,351
3 Loose box system of preserving cattle manure.	24,532

Green manures.—Paddy crop with assured water supply responds best to green manuring and hence this was included under the intensive cultivation plans. Despite the handicaps of adverse seasons, 1,469 tons of all varieties of seeds to cover an area of 109,175 acres were distributed. An additional production of 14,757 tons of foodgrains is estimated. To encourage cultivators to take to green manuring, a scheme to supply green-manure seeds, free to those who undertook to give three bags (160 lb. each) of paddy

per acre, was put into operation during the year in Tanjore and Pattukkottai divisions. About 4,241 acres were green manured under the scheme and 12,634 bags of paddy were actually collected.

Besides, during the tree-planting week, large number of green-leaf yielding seeds, seedlings and cuttings of trees were arranged to be raised in all waste lands, field bunds and backyards. Wherever facilities existed, collection of green leaf and its application to crops was encouraged. During the year, a special drive was given for planting *Sesbania speciosa* seedlings on field bunds for green manure and seed production. In Tanjore district, planting of *Sesbania speciosa* seedlings on sides of field bunds in the Kar season for use as green manure for thaladi (second) crop was taken up on a large scale. Special efforts were made for raising nurseries of *gliricidia maculata* for planting seedlings on bunds and other waste places.

Composts—(a) *Rural compost.*—To make up the deficit in cattle manure, waste vegetable matter like weeds, grasses, dried leaves and stubbles of crops available with the ryots in villages, was made into compost manure by a simple process. This manure is found to be as good as cattle manure. To encourage ryots to dig pits for the purpose of composting waste material, a subsidy of rupee one for ton (or 50 cubit feet) of compost made was given. During the year, 90,745 tons of compost manure were prepared in the State. It is estimated to be sufficient to manure 18,149 acres contributing an additional production of 2,269 tons of foodgrains.

(b) *Urban compost.*—Municipalities and panchayats were preparing compost manure from town wastes like street sweepings and nightsoil. Intensive propaganda was done by the department to break down the prejudice against the use of nightsoil compost and as a result large numbers of ryots are now freely taking to its use. The quantity of manure prepared by 97 municipalities and 351 panchayats was 165,527 tons. This is sufficient to manure 57,016 acres, producing 7,127 tons of additional foodgrains.

Compost week was celebrated from 2nd to 8th October 1950. Intensive propaganda was done through lectures and practical demonstrations on composting in all districts.

Concentrated manures and fertilizers.—For intensive cultivation, heavier manuring to keep up production is very necessary. The department is not handling oil-cakes but its use in crop production by itself or in combination with cattle, green manures or fertilizers is advocated.

Among the fertilizers, sulphate of ammonia is finding the greatest and widest use. During the year, the following quantities of fertilizers were distributed to the cultivators from the depots of the department and by the tender firms and co-operative societies:—

	1950-51.	1951-52.
	TONS.	TONS.
Ammonium sulphate	83,188	60,401
Superphosphate, ammonium phosphate, etc.	13,968	14,028

Realizing the need for the use of phosphatic manures to keep up the fertility of the soil, these were sold at half cost under orders of Government. This enabled the distribution of large quantities of phosphatic fertilizers and created a demand for superphosphate among the cultivators especially in delta areas.

Agricultural tools and implements.—Improved implements and tools were popularized through propaganda and demonstration. Intensive propaganda for the use of power machinery was done under the 3-year intensive cultivation plan as already mentioned. The following are the particulars of agricultural implements and tools sold to the cultivators. These are also being distributed through the village co-operatives :—

Iron mould broad ploughs	...	...	414
Water lifts	...	...	1,555
Other implements and tools	...	...	1,317
Spare parts for ploughs	...	...	2,433

Soil conservation.—The dangers of soil erosion are sought to be off set by well-established measures by the extension staff as part of their regular work whenever it was serious. This was done in addition to the scheme of contour bunding and other soil conservation measures over large compact areas in Rayalaseema. The following soil conservation works were carried out in the districts.

	...	...	...	ACS.
1. Terracing	...	...	...	1,927
2. Contour bunding	...	...	...	7,115
3. Gully plugging	...	...	...	303
4. Levelling land	...	...	...	3,765
5. Hedge planting	...	...	...	4,094
6. Contour cultivation	...	...	...	69,431

Loans.—To finance poor cultivators to take up to cultivation in time and for adequate manuring of their crops, District Agricultural Officers are empowered to issue loans interest free, for purchase of seeds and manures and with interest, for purchase of agricultural implements, subject to a maximum of Rs. 120 in each case of the former loans and Rs. 100 in the latter. During the year Rs. 31.51 lakhs were sanctioned for seeds and manures and Rs. 19,000 for agricultural implements as against 21.97 lakhs for seeds and manures and Rs. 29,000 for agricultural implements, in 1950-51. Besides, under the intensive manure scheme, Rs. 71.03 lakhs of interest-free loans repayable at the end of harvest season were granted as against 61.36 lakhs last year.

XIII. HILL TRIBES—UPLIFT SCHEMES.

Special schemes for the uplift of the hill tribes of the Agency tracts of Visakhapatnam and Srikakulam districts, the Koyas in East and West Godavari districts, the Yenadis of Chittoor and Kurumbas of the Nilgiris were in operation. Seeds, manures and

agricultural implements were distributed free and/or at concessional rates to encourage them to take to their use. These hillmen were also trained in improved agricultural methods by special agricultural staff and in Agricultural Research Stations.

XIV. PLANT PROTECTION.

The Plant Protection Scheme was continued as part of the intensive cultivation plan of the State. The Plant Protection Service has been found to be very useful and has become very popular. There is a great demand for help to combat pests and diseases affecting crops and plants, from the public. The sprayers, dusters and pesticides required were held in stock in all agricultural depots and reserve stocks were also held in district headquarters' depots.

The following pests of food crops were tackled during the year :—

The army worm, cut worm, mealy bug, striped bug, jassids, thrips, blue beetle, rice bug, leaf roller, green hoppers, root-grubs, caseworm, stem borer, mites, grass hoppers and earhead bug on cholam and cumbu and cut worm and root-grubs on ragi. Pests of stored foodgrains in Government depots and private granaries were also tackled.

Among the pests of other crops tackled were the thrips on chillies and onions, prodenia and aphids on tobacco, termites and borers on sugarcane, leaf caterpillar on gingelly, red-hairy caterpillar and 'surul' on groundnut, black-headed caterpillar and rhinoceros beetle on coconuts.

Among fruit pests the following are the important ones tackled, mango hopper, leaf caterpillar, white ants, leaf miners on citrus, grape vine flea beetles, pomegranate butterfly.

Among vegetable crop pests, epilachna on brinjals, pumpkin beetle, brinjal aphids, tingid bugs, fruit borers and jassids, cut worms and cockchafers on potatoes and aphids on lablab, are the important ones controlled.

An intensive campaign was carried on against field rats by using zinc phosphide as poison bait.

Among the diseases tackled, the following are the more important ones—paddy blast and foot rot, cholam short smut, ragi blast, sugarcane smut and red rot, turmeric leaf spot, chilly fruit rot and mildew, tobacco damping off, citrus mottle leaf, canker and die back, downy and powdery mildew on grape vine, potato ring disease, early blight and virus diseases, tomato leaf spot, damping off in chillies, cabbage and brinjal, coconut stem bleeding and areca-nut mahali or *Koleroga*.

To encourage the cultivators to take to pest and disease control measures, the pesticides are offered at half rate and the hand operated dusters and sprayers are equipment issued free. Only power operated sprayers are let out on hire.

During the year 785,628 acres of food crops, 80,775 acres of other crops and 408,479 numbers of fruit and economic plants have been saved from loss due to pests and diseases. It is estimated that 21,674 tons of foodgrains have been saved from loss.

The Plant Protection Officers were also in charge of the work of biological control of insect pests. In all 11,127,530 parasites of coconut caterpillar (*Nephantia serinopa*) were reared in the laboratory at Razole and liberated during the year. The caterpillar pest was not noted on an appreciable extent in any of the coconut areas in the Circars, Salem or in West Coast. Five hundred and forty-four thousand *Trichogramma* adults were released for control of paddy leaf folder in Guntur district.

Bee-keeping.—Development of bee-keeping in the districts was also under the control of the Plant Protection Officers (Entomology). About 29 special bee-keeping maistris were stationed in the districts of Srikakulam, Visakhapatnam, East Godavari, West Godavari, Krishna, Guntur and Chittoor. Bee-keeping work in the Madras City was attended to by the special Agricultural Demonstrators for Vegetable Scheme in the City. The staff rendered help in hiving new colonies, serving the existing colonies, demonstrating extraction of honey and did propaganda for furthering bee-keeping. Over 3,002 hives are reported to have been maintained in the N Circars and an income of Rs. 90,060 is estimated to have been gained through bee-keeping this region. In the southern districts the Plant Protection Assistants attend to bee-keeping work and 108 new colonies were hived through their efforts. Lack of adequate bee pasturage and heavy toll from disease are the two limiting factors in extending this subsidiary industry.

XV. RURAL WELFARE SCHEME (FIRKA DEVELOPMENT).

Intensive rural reconstruction work under the rural development scheme was carried on in 84 firkas in the State during the year. The services of one experienced fieldman and two maistris for each firka were loaned for work in these areas. Agricultural improvement work was carried on in co-operation with the Firka Development Officers. Propaganda and demonstration was carried on for proper preservation of cattle manure, better methods of cultivation, etc. Improved seeds of paddy, millets, pulses and green manures were distributed. Model farms were established in each firka.

XVI. VANAMAHOTSAVA.

The National Tree Planting Week was observed from 1st July 1951. Agricultural Officers and staff toured in their jurisdictions and in co-operation with the Revenue, Forest, Public Works, Education and Health Departments, successfully carried out the Vanamahotsava programme. Saplings, cuttings and seeds of trees of economic value were planted and greater emphasis was laid on

green leaf yielding and oil bearing and fodder producing types. About 41 lakhs of trees were planted during the year. Coconut seedlings to the extent of 2,592 were sold at half cost. Leaflet on tree-planting was published and distributed widely. Cinema slides on method of planting trees were exhibited in cinemas during the tree-planting week. Standing and Executive committees consisting of officers and non-officials continued to function. The Director of Agriculture was the convener for both the committees. Three meetings of the State Committee and six meetings of the Executive Committee were convened. Suggestions and recommendations made by these Committees were passed on to Government and concerned departments for necessary action.

XVII. SPECIAL PROBLEMS, PROGRAMME AND WORK DONE IN THE DISTRICTS.

1. **Srikakulam.**—The main problem was to find suitable varieties and strains for rainfed paddy saline areas and second crop areas. The Agency development received special attention. Two Agricultural demonstrators are working at Sithampet and Gummalakshimipuram agencies. The district has good potentialities for development of bee-keeping as an Agro-industry. Four trained maistris were specially appointed for the work. They were able to introduce bee-keeping in 37 villages so far. With the development of sugar industry in the district cane area has increased considerably and the problem of manuring is sought to be solved by raising sunnhemp as green manure to reduce the quantity of concentrated manure applied. Due to high prices for jute that prevailed last year the area under Mesta (Bimilipatnam jute) has considerably expanded but the present slump in prices has created the problem of marketing the large stocks held by the growers.

2. **Visakhapatnam.**—Hurried preparation of paddy nurseries along with thick sowing are still practised. The advantages of early preparation of nursery bed and their sowing are emphasized in propaganda. Suitable varieties and strains are required for particular regions of the districts and these are under introduction and trial. Manuring of all crops is often neglected due mostly to poverty of the cultivator. So encouragement of the cultivation of green manure as mixed crops and granting of loan for purchase of manures and fertilisers are done. Bee-keeping as a cottage industry is specially attended to by three trained demonstration maistris.

3. **East Godavari.**—Special attention was paid to the trial of varieties and strains suited to special conditions such as semi-dry paddy lands in Peddapuram and Pithapuram taluks saline lands in the coastal areas and submergible areas in Rajahmundry, Kakinada and Amalapuram taluks. Special efforts were diverted towards the uplift of the hill tribes, the Koyas, by distribution of seeds, manures, implements either free and/or at concessional rates.

4. **West Godavari.**—For the normal paddy area sufficient number of strains are available but for deep water or submergible conditions that exist in Kollair lake region suitable varieties

and strains are required. A rice sub-station for this purpose was opened last year at Pulla. Virginia tobacco is a very important crop of the dry lands and nucellus seeds of H.S. 9 is being distributed. There is scope for development of bee-keeping and hence 8 trained demonstration maistris were appointed and through their efforts over 1,400 hives were maintained and about 10,000 lb. of honey were extracted.

5. *Krishna*.—The problem of finding suitable varieties for submergible areas that exists in Kaikalur taluk is still to be solved and awaits release of strains from the deep water paddy breeding station at Pulla, West Godavari district. H. 420, an early improved strain of cotton was found to be suitable as a pure and mixed crop in the dry land areas. Groundnuts and cotton are under trials in the rice fallows of the district. During the year an intensive campaign against the mango hopper was conducted; Guesarol 550 was sprayed with effective result over 21,170 mango trees.

6. *Guntur*.—Virginia tobacco, cotton and chillies are very improved varieties to the extent of 60, 10 and 800 acres with H.S. improved varieties to the extent of 60, 10 and 800 acres with H.S. 9, G. 1 and C. 1 strains, respectively, were run. Campaign against thrips on chillies and field rats in paddy fields and damping off in tobacco nurseries were successfully conducted.

7. *Kurnool*.—Due to failure of rains, famine conditions set in Koilkuntla, Giddalore, Markapur and Banaganapalle taluks. The heavy rains in May while relieving water scarcity caused floods in which large number of livestock perished. But all tanks got filled. Seeds of short duration paddy varieties were supplied to tank-fed areas to enable the cultivation of short-term paddy crop. Virginia tobacco is getting popular in the district especially in Giddalore where I.L.T.D. Company, have opened a branch office for marketing. Laxmi Cotton, an improved American type introduced from Bombay State, has been found to give good yield with better quality in comparison with local varieties. Seed farms for multiplication of 881 F were arranged.

8. *Bellary*.—Under H. 1 cotton multiplication scheme 6,500 acres were arranged and 6,500 bags of seeds were procured for distribution. Demonstrations in the use of water lifts and laying out fields for proper irrigation were given so as to train the cultivators to make use of water when the Tungabhadra Project starts functioning from next year. Necessary steps for starting demonstration farms, for supply of improved seeds and green manure seeds in the project area are being taken. Laxmi cotton introduced from the Bombay State is spreading on account of better yield and quality.

9. *Anantapur*.—The district experienced one of the worst famine years. Both dry and irrigated crops suffered. There was dearth of drinking water in many villages. A campaign was

launched for treating jonna seeds with sulphur against short smut disease. Soil conservation work was pushed through. 881 F a strain of Mungari cotton is getting popular. Tractor-ploughing is very popular and extensive areas of fallow lands are being reclaimed.

10. *Cuddapah*.—Acute famine conditions prevailed throughout the district. Oil engine pump-sets were made available on hire and also on hire-purchase system. Spring channels were deepened with Bulldozers and an area to the extent of 1,078 acres were reclaimed by tractor-ploughing. Laxmi cotton is becoming popular in this district also. Fruit cultivation is a special feature of the district and special efforts were made to supply suitable plants for new plantings and necessary advice was given for better upkeep of the existing gardens.

11. *Nellore*.—The rainfall during both the monsoons was disappointing. Suitable blast resistant strains are available for the main paddy crop, yet suitable ones have to be found for semi-dry, dry and second crop areas. Short duration blast resistant strains are also required. Trials to this end are in progress at the rice sub-station, Buchireddipalem. A campaign against field rats was organized using zinc phosphide as bait.

12. *Chingleput*.—The seasonal conditions were adverse in the district and especially in Sriperumbudur and Tiruvallur taluks since 2 or 3 crops of paddy are taken in a year, planting of Sesbania along bunds was advocated. This will solve the manure problem of paddy lands where very little manuring is practised. Saline, water logged and swampy lands exist in coastal taluks. These are being tackled by suitable drainage and introduction of special varieties. A vegetable seed farm was organized and large quantity of seeds of different kinds of vegetables were produced.

13. *South Arcot*.—Cambodia Co. 4 B-40 is spreading in the district during the Masipattam season. There is very great scope for cotton cultivation in rice fallows provided market facilities, could be arranged. Necessary help is being given in this direction by making suitable arrangements with one or two longstanding traders in cotton. Suitable varieties of millets are yet to be fixed. Sugarcane, the important crop in factory area is attended to specially with reference to manuring to obtain optimum yield at reduced cost. Suitable varieties to prolong the crushing period are also being tried. Seed multiplication of suitable strains of groundnut are being done under a scheme.

14. *Chittoor*.—This district is one of the worst famine-affected areas due to failure of rains for the past five years in succession. Even drinking water for human beings was difficult to obtain in some villages. Contourbunding, a soil conservation measure, was taken up as a famine relief measure. The river pumping scheme initiated last year very successfully worked and there is great scope for extension in this direction. About three tons of food crop seeds were distributed free to Yenadis to encourage them to

take up cultivation. Through the special grant of Rs. 1,000 given by the Rayalaseema Development Board, 20 puddlers-cum-tramp-ers were purchased and sold to ryots at half cost.

15. *North Arcot*.—This is also one of the districts affected by famine but not to the extent as Chittoor. Well digging and deepening were in progress throughout the district. To relieve water scarcity, special allotment of oil engine pump-sets and electric motor pump-sets on hire-purchase system, was made. Planting of *Gliricidia* on field bunds and waste lands and *Sesbania* along field margins was advocated to solve the problem of green manure supply in the district. Large quantity of short duration paddy seeds are held in stock for sale to ryots.

16. *Salem*.—The seasonal conditions were not quite normal throughout the district. There is great scope for extension of well irrigation and river pumping scheme. Large extent of uncultivated lands are available for reclamation. Suitable varieties of paddy for dry land cultivation are sought to be fixed up through trial plots. There is a special scheme of raising cotton (K-5) by reclaiming waste lands for supply to the Khadi development centre in Attur taluk. Sago manufacture from Tapioca has developed considerably in the district as an Agro-industry and 92 factories are functioning.

17. *Coimbatore*.—The season was on the whole not favourable and famine conditions existed in certain areas. To solve the green manure problem planting of *Sesbania* along with paddy and *Gliricidia* on field bunds was advocated. Cotton is a very important commercial crop. Large quantity of improved seeds was distributed under the cotton extension programme. The water from the Lower Bhavani Project is likely to be available soon. A research station to explore the profitable crops that can be raised in the project area was initiated during the year. Arrangements for supply of improved seed of some crops, green manure seeds and Uganda cotton seed are being made so that with the availability of water, cultivation could be started.

18. *Tiruchirappalli*.—The problem of providing suitable paddy varieties for dry, submergible and alkaline areas was under trial. To provide green manure for the Thaladi crop in double-crop lands, *Sesbania* is grown along the bunds during the first crop. This practice is becoming popular. In other areas there is a natural spread of green manure crop—Kollingi. Introduction of Madras Uganda 1 cotton in the tract and trial of short duration P. 216 F cotton in rice fallows were special features of the year.

19. *Tanjore*.—The two main problems of the district are, (1) manuring paddy lands and (2) utilization of rice fallows:—

The problem of manuring paddy crop—Thaladi, is sought to be done by raising *Sesbania* seedling with Kuruvai paddy crop along field margins and after harvest of Kuruvai, the green manure crop *Sesbania* is used for Thaladi. During the year 9,669 acres were

thus treated. Besides, *Gliricidia* seedlings numbering 111,936 were planted on field bunds for supply of green leaf.

To solve the problem of utilizing rice fallows profitably two schemes were introduced. One is the tube well scheme for supply of irrigation during the fallow period in summer. This will enable cultivation of cotton crop during the fallow period and also early raising of Kuruvai nurseries. About 60 tube wells have been sunk. The second is the introduction of short duration cotton strain known as P. 216 F from Punjab. The provision of tube wells for irrigation and supply of seeds of P 216 F cotton have enabled the utilization of rice fallows profitably and over 1,803 acres of cotton have been raised. To enable proper marketing, a cotton growers' co-operative society was formed.

20. *Pattukkottai*.—The problem of cultivating the saline tracts of the district was sought to be solved by introducing SR. 26B. The area under this strain is fast increasing. To solve the manure problem planting of *Gliricidia* on field bunds and *Sesbania* along field margins are being advocated. Cotton crop in rice fallows is being introduced wherever irrigation facilities exist.

21. *Madurai*.—Soil conservation in dry lands is an important problem which has to be tackled. Horticultural extension work was commenced by the appointment of a Horticulture Assistant at Kodaikanal. Sugarcane area is increasing under the influence of the factory at Ammanaickanur and problem of adequate manuring is being attended to. Similarly irrigated cotton in both the winter and summer season is increasing. Introduction of suitable variety and propaganda for adequate manuring, are being attended to.

22. *Ramanathapuram*.—Vast areas of lands are lying waste due to various causes. SR. 26B paddy strain is being tried in saline areas. There is scope for introducing special schemes for light irrigation from wells and rivers. Uganda cotton known as Rajapalayam cotton grown in the district is one of the best cotton in India. The problem of further improvement of this cotton variety is in progress at Srivilliputtur. An agricultural farm will be opened at Paramakudi to tackle special problem of the district.

23. *Tirunelveli*.—Area under Uganda cotton is increasing. It is grown both as a summer as well as a winter crop and problems connected with its cultivation and manuring are being tackled by supply of improved seeds and manures. There is scope for introducing lift irrigation schemes in irrigated areas to stabilize and improve production.

24. *North Malabar*.—This division part of Malabar district has been newly formed. There is scope for introducing lift irrigation schemes along the rivers. Hill grass is available in plenty and its preservation as silage is being encouraged by payment of subscription of Rs. 2 per ton silage produced. Over 47 tons of good quality silage were produced.

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25. *South Malabar*.—The headquarters of the district was shifted from Kozhikode to Shoranur a more central place. Chilli is getting popular as a dry land crop and suitable varieties are yet to be fixed up. Similarly cotton (Uganda) is getting popular in certain tracts. The area under Tapioca has considerably increased due to scarcity of food grains but prices were not attractive towards are being studied under the Indian Council of Agricultural Research Scheme at Pattambi. Ginger is also a very important money crop and research on this is in progress at Pattambi also partly under the aid of the Indian Council of Agricultural Research.

26. *South Kanara*.—The climatic conditions seem to be suitable for raising sea island cotton and trials are undertaken to evolve a suitable strain. MTU 3 & 4, two strains introduced from West Godavari, have done well and are becoming very popular. Co. 25, a blast resistant strain was found suitable as a second crop. There is scope for introducing power lift irrigation schemes, along the rivers.

27. *Nilgiris*.—Adverse seasonal conditions prevailed in the district and potato the main crop, gave poor yield. The Tangumalalada collective farming society was assigned a further area of 300 acres of forest land. At present good seed potatoes produced on seed farms are distributed to ryots but proposals are under consideration to start a scheme for supply of disease-free potato seed. Soil erosion is a serious problem and the special staff sanctioned surveyed the tract and necessary proposals for taking up soil conservation measures in Koti Valley have been submitted.

XVIII. AGRICULTURAL MARKETING.

1. Agricultural marketing work was attended to by the State Marketing Officer, stationed at Madras along with the assistance of Assistant Marketing Officers, stationed at Cuddapah, Kakinada, Coimbatore and Tiruchirappalli. The main items of work consist of (i) market survey of new products, (ii) revising the market reports by further investigation, (iii) rendering help in grading commodities, (iv) organizing regulated markets, (v) furnishing market information on important agricultural commodities and (vi) giving advice and help in marketing agricultural produce.

2. *Market surveys*.—Two reports on the marketing of (1) fish and (2) cattle in Madras State, were released during the year. A special survey report on tapioca was prepared. Data was collected for preparing a special report on cash crops such as ginger, pepper, cardamum, cashewnut, lemon-grass oil and turmeric as required by the Special Committee of the Indian Council of Agricultural Research. The following market reports were revised by incorporating data up to date: Rice, millets, pulses, turmeric, pepper, cashewnut, castor, groundnuts, sugarcane and tobacco. Supplementary information on marketing relating to mangoes, potatoes,

tobacco, pulses, and coconuts was collected and sent to the Agricultural Marketing Adviser to the Government of India. Work relating to market surveys was continued along with the development programme. Data on the cost of cultivation of the important crops was collected in the major growing districts.

3. *Grading of commodities*.—A new grading station for ghee was opened at Ongole. Altogether there are five grading stations for ghee, two in the northern districts at Guntur (1) and Ongole (1) and three in the southern districts at Madurai (1) and Tiruppur (2). Owing to adverse seasonal conditions the quantity of ghee available for grading was much less than last year. The quantity of ghee graded during 1950-51 was 9,046 railway maunds valued at 17.3 lakhs of rupees while in 1951-52 it was only 6,583 railway maunds valued at 12.1 lakhs of rupees. The graded ghee from Madras had a good market in Calcutta and Delhi. Hen eggs were graded by six authorized packers four at Madras, one at Katpadi and one at Ootacamund. During 1951-52, 10.80 lakhs of eggs valued at 1.42 lakhs of rupees were graded as compared to 11.26 lakhs of eggs valued at 1.38 lakhs of rupees in 1950-51. The grading of sathugudi oranges by the Kodur Fruit Growers' Co-operative Society, Rajampet, had a set-back, owing to financial difficulties. In 1951-52, about 20,000 fruits valued at Rs. 2,300 were graded as against 278,000 fruits valued at Rs. 33,600 during 1950-51. The grading of potatoes on the Nilgiris during 1951-52 continued and a total of 8.8 thousands of railway maunds valued at 128.4 thousands of rupees were graded, as compared to 4.2 thousands of railway maunds valued at 46.5 thousands of rupees during 1950-51. There was fair demand for graded potatoes both in Calcutta and Bombay markets.

The grading of cigarette tobacco continued to be carried out by the Central Government staff. The total value of the produce graded under "Agmark" in Madras State was Rs. 14.8 lakhs in 1951-52 as against Rs. 19.4 lakhs in 1950-51. The details are given in Appendix V.

4. *Regulated markets*.—Market committees were constituted for the two newly notified areas of (i) Tirunelveli district for cotton only and (ii) Ramanathapuram district for cotton and groundnut under the Madras Commercial Crops Markets Act. They have not yet begun functioning. The Government have notified the intention of declaring North Arcot district as notified area for groundnuts, under the Madras Commercial Crops Markets Act. A further step was taken, this year, by the State Government in restricting sale of tobacco at the Mangalagiri market yard to an area within a radius of five miles. The auction sales at the Guntur market yard, continued. Proposals have been submitted for establishment of regulated market for groundnuts and tobacco in Tiruchirappalli district. The proposals to include tobacco in the scope of the work of the Coimbatore District Cotton and Groundnut Market Committee, was postponed in order to give time for the

committee to make necessary arrangements for storage accommodation of tobacco.

The work of the individual market committee is summarized below :—

(1) *Coimbatore District Cotton and Groundnut Market Committee.*—Owing to adverse seasonal conditions the production of cotton was badly affected. The total arrivals into the market this year, consequently decreased as given below :—

Cotton arrivals into the market limits of Tiruppur.

Year.	Lint in candies.	Kapas in pothis.
1949	6,511	230,916
1950	2,180	177,115
1951	4,051	139,368

All the purchase and sales continued to be restricted to the market yard at Tiruppur within a radius of 5 miles. Every merchant was provided with a godown in the market yard. A daily market report of the Committee containing information regarding the daily prices of lint and kapas and seeds of the local market and the cotton prices of New York and Bombay was issued regularly.

(2) *Bellary District Cotton and Groundnut Committee.*—The Committee selected sites for the construction of market yards at Bellary, Kottur and Yemmiganur. The total arrivals of cotton and groundnut during the year 1951 at Bellary and Adoni as compared to arrivals in 1950, are given below :—

	1950.		1951.	
	Adoni.	Bellary.	Adoni.	Bellary.
Groundnut pods (bags) ..	482,087	132,130	450,623	181,493
Mungari kapas (Dokras) ..	6,373	3,379	6,722	11,769
Farm kapas (Dokras) ..	67,387	..	60,836	10,773
Mungari lint (Dokras) ..	1,993	200	824	1,229
Farm lint (Dokras) ..	31,033	..	24,626	7,935

Daily auctions of groundnut and cotton were held in all the market centres of the district.

(3) *South Arcot Groundnut Market Committee.*—The total arrivals of groundnut kernels in the different market yards during 1951, were as follows :—

Name of market yard.	Notified from growers.	Area from traders.	Non-notified area.	Total.
		(TONS OF KERNELS.)		
Cuddalore	5,764	78	..	5,842
Villupuram	10,020	85	..	10,105
Tindivanam	6,245	106	..	6,351
Tirukkoyilur	4,806	549	980	6,335
Ulundurpet	807	12	685	1,404
Vridhachalam	6,750	241	..	7,000
Panruti	2,825	170	8,604	11,599
Chinna Salem	865	310	..	1,175
Total ..	38,082	1,551	10,357	49,990
Percentage ..	76.2	3.1	20.7	100

76.2 per cent of the arrivals to market yards came from growers.

The total arrivals of the crop in 1951 to all the eight market yards amount to 49,990 tons of kernels as against 49,385 tons in 1950. The arrivals to the market yards formed 85 per cent of the arrivals to the market centres. The percentage of arrivals and the number of lots handled in each market yard are given below :—

	Number of lots handled.	Percentage of arrivals to market yards.
Cuddalore	20,789	96.6
Villupuram	38,968	93.7
Tindivanam	25,031	59.8
Tirukkoyilur	29,324	75.9
Ulundurpet	4,787	54.5
Vridhachalam	65,390	97.5
Panruti	15,681	90.9
Chinna Salem	5,382	84.8

The high percentage of arrivals into the market yards and the large quantity brought by the growers themselves for sale in small lots shows that the Market Committee is catering to the needs of even the poor primary growers of groundnut in South Arcot district. The marketing was so popular, that it attracted nearly 20.7 per cent of the arrivals from outside the notified area. The daily auctioning system continued, in all the yards, and the prices paid for the crop sold at the market yards, compared favourably with those paid for the crop sold at private trade premises.

(4) *Guntur Tobacco Market Committee.*—Introduction of auction sales of tobacco in the market yard at Mangalagiri, in addition to Guntur was a further step taken in the marketing of tobacco in Guntur district. The quantity of tobacco totalling 9.37 million pounds sold by auction for cash and by private treaty on credit at Guntur and Mangalagiri market yards was as follows :—

	1951-52 season (000 lb.)			
	By auctioning.		By private treaty.	
	Guntur.	Mangalagiri.	Guntur.	Mangalagiri.
Flue-cured virginia ..	234	291	3,058	1,751
Sun-cured virginia ..	1,092	384	201	23
Sun-cured (country) ..	1,155	..	951	..
Total tobacco ..	2,481	675	4,210	1,774

The percentage of tobacco sold by auction improved in Guntur during 1951. It was 36, as compared to 32 in 1950. At Mangalagiri, the quantity of tobacco sold by auction, to the total transactions, was only 27 per cent this being the first year of auctioning.

Exports of tobacco outside the notified area during 1951 were as follows:—

Year.	Fine-cured virginia.	Sun-cured virginia and country.	Gulla.
	Quantity Railway maunds.		
1950	1,033,824	750,342	184,484
1951	643,691	444,548	160,353

The fall in the quantity exported, is due to the poor crop outturn during 1951.

(5) *Nandyal Cotton and Groundnut Market Committee.*—This is the only Committee in Madras State having jurisdiction over a municipality while the rest are all District Committees. Proposals have been submitted to the Government for expanding into a District Committee for the whole of Kurnool district. The construction of godowns and offices at Nandyal were delayed due to the non-availability of iron and steel materials. The daily market rates were continued to be published both for cotton and groundnut. The total arrivals of cotton and groundnut into the market were as follows:—

Year.	Cotton kapas (kuntalams of 1,680 lb.).	Cotton lint (torahs).	Groundnut pods (candies of 500 lb.).	Groundnut kernels (candies of 531 lb.)
1949	6,489	2,701	2,727	..
1950	9,837	1,990	52,932	10,350
1951	7,687	1,402	48,473	21,618

(6) *The Krishna District Tobacco and Groundnut Market Committee.*—Suitable godowns were taken on rent at Nandigama for accommodating the market yard for groundnut, as directed by the Government. Market intelligence was published every day during the season in the market yard. During 1951, the following quantity of tobacco and groundnut were handled in the notified area:—

	1949.	1950.	1951.
	LB.	LB.	LB.
Flue-cured virginia ..	5,943,970	8,595,912	11,044,857
Sun-cured virginia ..	114,080	99,185	436,197
Flue-cured gulla ..	79,293	497,782	937,550
Natu (country tobacco) ..	2,388,100	3,682,432	5,639,339
Groundnut pods ..	TONS. 68	TONS. 1,055	TONS. 42,130
Groundnut kernels ..	17,054	20,479	24,879

(7) *Anantapur District Cotton and Groundnut Market Committee.*—Sites for the opening of market yards in the four important centres at Kadir, Hindupur, Tadpatri and Guntakal were selected and steps to acquire the same are pending with the Revenue

Department. The arrivals of cotton and groundnut in the various markets during 1951, were as follows:—

	Guntakal. TONS.	Tadpatri. TONS.	Kadir. TONS.	Hindupur. TONS.	Total. TONS.
Western lint (Bales of 392 lb.)	13,536	12,889	..	..	26,425
Groundnut pods (candies of 531 lb.)	..	28,567	..	..	28,567
Groundnut kernels (can- dies of 531 lb.)	28,710	12,506	68,867	29,512	140,595

(8) *The East Godavari Groundnut and Tobacco Market Committee.*—Attempts were made to open a market yard near Rajahmundry for tobacco. The first nominated committee ceased to function from 5th July 1951 and the renominated committee continued thereafter.

(9) *The Malabar Coconut and Arecanut Market Committee.*—Attempts were made for opening a market yard at Chalissery. Steps were taken to standardize the weights used in copra and arecanut trade. Market information was published periodically regarding arrivals, stocks and prices.

(10) *The South Kanara Coconut and Arecanut Market Committee.*—A market yard at Mangalore was set up by the Committee and produce to a very limited extent, arrived for disposal. The Commission rates were regularized and the weighments were checked.

With the functioning of the Tirunelveli and Ramanathapuram District Committees, there would be in all 13 market committees in Madras State, of which only one is a small committee and the rest 12 are all district committees. With the inclusion of North Arcot District and Tiruchirappalli District Committees, there would be in all 15 committees, covering a fairly good area under cotton, groundnut, tobacco, arecanut and coconut.

The marketing staff helped in the day-to-day work of the market committees such as framing of by-laws, arrangement of sales and auctions, general improvement of the market, etc. As ordered by Government in G.O. No. 50, Food and Agriculture, dated 10th January 1952, propaganda in favour of the Madras Commercial Crops Markets Act was carried out in Tirunelveli, Ramanathapuram and North Arcot districts explaining the provisions of the Madras Commercial Crops Markets Act and the benefits conferred by it as a preliminary step. A new cadre of secretaries for market committees, has been sanctioned by the Government to work under the State Marketing Officer, and the Director of Agriculture. The market committee's functions would be more well scrutinized, as a result of this change.

5. *Market Intelligence Service.*—Enquiries from growers, co-operative societies and members of the trade regarding better marketing of their produce, were attended to. A directory of

merchants and growers was maintained and addresses were furnished to parties when required. Fortnightly prices of commodities were ascertained in the wholesale markets at Madras, Tiruchirappalli, Madurai, Kakinada and Coimbatore. Prices of agricultural commodities like jute, sunn-hemp, jaggery, sugar, arecanut, etc., were furnished to the Economic Adviser to the Government of Madras. Information on stocks of foodgrains available in some places like Nandyal, Salem, Kumbakonam and Kakinada was also furnished to the Economic Adviser. Weekly prices of milch cattle at Tiruvottiyur and egg prices in Madras City were also furnished. Weekly vegetable prices in Madras, Tiruchirappalli, Kakinada and Coimbatore were also collected. A review of market conditions every month was submitted as ordered by Government. Special reports on sugarcane, onions, chillies, groundnut and cotton were also furnished. Fortnightly review of cotton situation was also prepared.

A number of pig rearers were contacted and they were encouraged to collect and market bristles of pigs in Madras State in order to get good prices.

6. *Co-operative marketing*.—The marketing staff contacted the co-operative societies and helped them in the better marketing of the produce of the members. The Provincial Co-operative Marketing Society, the Salem Central Co-operative Stores, the Nilgiris Co-operative Marketing Society, the Tirupur Co-operative Sale Society, the Katpadi Egg Marketing Society, the Malabar District Co-operative Marketing Society, the Ponnani Arecanut Society and the South Kanara Central Co-operative Stores. The Chennur Betel Leaves Society, the Kodur Fruit Growers Society and the Madras Milk Supply Union, were some of the important co-operative societies, to whom help was rendered in marketing the produce. Help was also rendered in organizing a co-operative cotton marketing society for Tanjore district.

7. *Market Legislation*.—In a number of instances steps were taken to amend the by-laws of the market committee and the various rules under the Madras Commercial Crops Market Act. The by-laws of the newly formed Tirunelveli Cotton Market Committee were scrutinized. A comprehensive note on the various legislative measures taken in Madras regarding marketing of produce was furnished to the Agricultural Marketing Adviser to the Government of India, Delhi.

8. *Work done for other department*—(a) *Commissioner of Civil Supplies*.—Several samples of rice and paddy were analysed. Experiments were conducted with Tanjore paddy at Koilpatti and Tuticorin to determine the percentage of rice to paddy. The exportable surplus of onions, jaggery and chillies were worked out. Various problems arising out of the enforcement of the Madras Rice Mills Licensing Order, received attention. The "Malekised process of preparing rice", was given publicity. Fortnightly reports on the emigration of cattle to neighbouring States, were also submitted.

(b) *Director of Industries and Commerce*.—Information regarding "Mesta" jute was furnished. Samples of woven aloe fibre were supplied along with information regarding the availability of the same. A report regarding the Chief market centres in Madras State, and a detailed list of market centres in each district along with the list of commodities transacted was furnished.

(c) *Director of animal Husbandry*.—Information regarding the utilization of blood in slaughter houses, was furnished. A note on the possibilities of expanding the trade in pork at Mangalore, was sent. The availability of maize bran in Punjab and Uttar Pradesh, was intimated.

(d) *Economic Adviser to the Government of Madras*.—Information on the saleable surplus of some agricultural commodities was furnished. The estimated production of milk, yield of tamarind and export and import of chilly, pulses, gram, mango, jaggery, egg and hide during 1948-49 were also communicated. Information regarding market charges in regulated markets was provided. Weekly prices of palm jaggery, cane jaggery, sugar and arecanut were furnished.

9. *Transport*.—Export and import data were collected from all important railway stations, for the various commodities. The railways were addressed to give special facilities for the transport of betel leaves, eggs, cattle, cotton, groundnut, etc. A special report was prepared on transport facilities available for potatoes in the Nilgiris. The exports and imports by sea, either foreign or inland, of many commodities were collected from the Customs House records.

10. *Review of prices and marketing conditions*.—The increase in the bank rate from 3 to 3½ per cent during the close of the year 1951 by the Government of India was an important factor affecting the general financing of the trade. Later, the scheduled banks began restricting accommodation of credit on the commodities resulting in a tighter money market condition. The discontinuance of food subsidy to various States by the Government of India was announced during February 1952. The markets showed a tendency to fall in prices by February 1952 due to both internal and international reasons. The crash in prices started with groundnut during February 1952 which spread quickly to the other sections also casting a gloom in all the markets by March 1952. Many markets remained closed for all practical purposes during March 1952. The Government of India took various measures to alleviate the distress of the traders by liberalizing foreign exports and reducing the export duties. The Government abolished the export duty on groundnut oil, Kardi seed and Niger seed during the month of March 1952. The export duty on cotton was also reduced by 50 per cent from 50 per cent *ad valorem* to 39 per cent *ad valorem*. The Government of India also announced their decision to secure adequate credit facilities to Indian textile

industry for financing the imports of American and African cotton. The floor prices of cotton were also revised. The unprecedented slump witnessed in all the sections of commodity market during March 1952 continued till the close of the year under review with narrow fluctuations.

The Government of Madras derationed first all millets and price control also was lifted. Later on, the control also was lifted. Later on, the control and rationing of foodgrains was abolished on 7th June 1952 with zonal restrictions on movement. The decontrol was welcomed by the traders, producers and the consumer. Immediately, after decontrol, the prices of rice and paddy did not shoot up, considering the advanced nature of the season, and rice was freely available in plenty in the retail markets everywhere ranging from Re. 0-15-0 to Re. 1-2-0 per Madras measure.

The increased output of sugar led to the abolition of rationing throughout the State. The price control was maintained for "control sugar", while some quantities were allowed to be sold in the "free" market. The difference in the prices of "control sugar" and "free market sugar" at Madras was negligible towards the end of the year under review. A quota of 50,000 tons sugar was allowed for export to foreign countries. As the prices of Indian sugar were fairly high, the entire quota could not be utilized by the trade. Jaggery production also was in excess and a quota of 25,000 tons was allowed for export from Madras to foreign countries.

The course of prices of important commodities during 1951-52 is summarized below :—

The prices of rice and millets, after the derationing, were selling only at about $1\frac{1}{2}$ times the control rates. Considering the advanced nature of paddy season, the rise in price was not considerable. The prices of various kinds of pulses also came down in common with the other commodities by March and went up a little by the end of June. Blackgram at Tirunelveli which was sold at Rs. 32-15-0 per imperial maund in July 1951 came down to Rs. 22-9-0 in March 1952 and again went up to Rs. 25-14-0 by June 1952. The redgram dhal and greengram dhal at Madras came down from Rs. 26-2-0 and Rs. 28-14-0 in July 1951 to Rs. 24-1-0 and Rs. 22-2-0 in June 1952 respectively. Cotton kapas prices at Tirupur tended to shoot up from September 1951 and Cambodia Kapas touched Rs. 172 per pothi of 280 lb. in November 1951 and were steady at that level till December end. The end of February and early March 1952 witnessed worldwide slump in prices of cotton and the local market also suffered a landslide; Cambodia Kapas came down to Rs. 75 per pothi during March 1952 but later recovered to Rs. 130 in June 1952. Cambodia cotton lint sold at Rs. 106 per imperial maund at Tirupur in the beginning of the year under report came down to Rs. 80 towards the end of the year. At Adoni also prices tumbled down from Rs. 79 per maund for Mungari lint and Rs. 93 for Farm lint at the beginning of the year to Rs. 52 and Rs. 60, respectively,

towards the end of the year. The groundnut kernels market also collapsed from Rs. 36 per maund at Adoni and Rs. 33 at Cuddalore to Rs. 19 in both the markets towards the end of the year under review. Groundnut oil prices also came down from Rs. 69 per maund at Madras to Rs. 42 towards the end of the year, while at Cuddalore the prices slid down from Rs. 68 to Rs. 43. Cane jaggery prices also had a heavy fall from Rs. 18 to Rs. 11 per maund at Bellary, Rs. 19 to Rs. 14 at Cuddalore, Rs. 18 to Rs. 9 at Vellore, Rs. 19 to Rs. 13 at Coimbatore, Rs. 18 to Rs. 6-8-0 at Vizianagaram and Rs. 17 to Rs. 12 at Chittoor during the course of this year. The prices of Punasa gingelly seed per maund at Vizianagaram came down from Rs. 45 to Rs. 30 and at Tiruchirappalli from Rs. 43 to Rs. 28, castor seed at Guntur came down from Rs. 39 to Rs. 20 per imperial maund and at Bellary from Rs. 30 to Rs. 17. Tamarind was sold at Rs. 16 per maund at Chittoor towards the end of the year, while in July 1951, the price was about Rs. 20. Turmeric at Guntur was badly hit and it slid down from Rs. 23 per maund in July 1951 to Rs. 12-8-0 in June 1952. The prices of West Coast produce also had a heavy fall during the year under review. Arecanut at Mangalore came down from Rs. 93 to Rs. 85 (husked) per imperial maund, copra (office quality) at Kozhikode from Rs. 62-5-0 to Rs. 41-2-0 per maund, coconut oil at Mangalore from Rs. 99-2-0 to Rs. 64-10-0 per maund, coconut (husked) at Tellicherry from Rs. 200 to Rs. 110 per 1,000 nuts, pepper at Kozhikode (Mysore quality) per maund. The prices of chillies dropped from moun and cardamom at Mangalore from Rs. 1,058 to Rs. 734 (Mysore quality) per maund. The price of chillies dropped from Rs. 76-10-0 to Rs. 39-12-0 at Tirunelveli (Samba variety) per imperial maund, while at Guntur the slide was from Rs. 65-13-0 to Rs. 32-15-0.

The situation can be summed up by saying that the prices of all commodities came down considerably after February 1952 and continued to be at that level till the end of the year under review with a slight recovery here and there in some commodities.

The Economic Adviser's index number of wholesale prices of foodgrains and commercial products in Madras State were as follows :—

(Base prices on 21st August 1939=100.)

	Food-grains.	Commercial products.
1949	378	534
1950	366	637
1951	375	673
1952 January	393	575
1952 February	394	553
1952 March	402	453
1952 April	406	443
1952 May	407	450
1952 June	411	466

While the prices of foodgrains did not change much, the prices commercial products showed a considerable fall as seen from the monthly index price for March 1952.

XIX. LEGISLATION AND STATISTICS.

1. *Weekly cotton mill and press returns.*—In accordance with section 5 of the Cotton Ginning and Pressing Factories Act, 1925, the ginning and pressing factories and the mills in the State have been submitting weekly returns in the prescribed forms. The weekly statistics are compiled and published in the *Fort St. George Gazette*. Copies of these weekly statements are also sent to the Economic Adviser, Government of India, New Delhi, the Secretary, Indian Central Cotton Committee, Bombay, and the Secretary, East Indian Cotton Association, Limited, Bombay.

2. *Cotton Transport Act—Annual general licences.*—Sixty-three licences with 2,711 certified copies were issued to the mills for the transport of ginned cotton for purpose of manufacture during the year from 1st February to 30th June 1952 as against 61 licences with 2,775 certified copies issued in the previous year.

Single licence by sea from 1st July 1951 to 30th June 1952.—During the year 114 sea licences were issued for the import of ginned cotton. These licences were for the import of 38,853 bales of 392 lb. each of ginned cotton for purposes of spinning.

Single licences by road.—Ninety-six single licences were issued during the year for the transport of 4,266,334 lb. of ginned cotton in the protected areas and 79 licences were issued for the transport of 913,500 lb. of cotton waste and mill sweepings in the protected areas of Cambodia and Tinnevely areas.

Single licences by rail.—Seventeen licences (single) were issued during the year for the transport of 519,412 lb. of ginned cotton and 146 licences were issued for the transport of 2,566,250 lb. of cotton waste and mill sweepings to spinning mills, dealers and exporters during the year for the import of cotton waste into the protected areas notified under the Cotton Transport Act. The details of licences issued for the import into the respective protected areas are given :—

Number of licence.	Kind of cotton.	A. Cambodia Area.		Purpose.
		Quantity.	LB.	
146	Cotton waste and mill sweepings.	2,566,250		Cleaning and pillowing pressing and export.
13	Ginned cotton ..	471,812		Spinning yarn.
B. Tinnevely Area.				
4	Ginned cotton ..	47,600		Spinning yarn.

3. *The Madras Cotton Control Act, 1932 (Act XVI of 1932).*—The Act continued to be in force in Coimbatore, Madurai and Tirunelveli districts.

4. *Certification schemes.*—With the object of getting exemption from price control for superior cotton grown in the State, certification schemes sanctioned in 1950-51 were continued during 1951-52 also.

G.O. Ms. No. 1727, Development, dated 17th April 1951.—Cotton Nandyal 14 Certification Order and cotton N-14 ginning and pressing rules for certification of kapas sanctioned for four months from 17th April 1951 continued up to and inclusive of 15th August 1951.

(2) *G.O. No. 3464, Development, dated 26th July 1951.*—The Scheme for Cotton Cambodia Co4 Production and Certification Order, 1951, sanctioned from 15th August 1951 to 30th November 1952 for 1951-52 summer and winter cotton crops continued to work during 1951-52. The certification starts from sowing stage.

(3) *G.O. Ms. No. 3658, Development, dated 9th August 1951.*—The Scheme of Certification of Cambodia Co4 including Co4/B40 cotton of 1951 summer crop sanctioned in the above Government Order started functioning from the middle of August 1951 and was extended up to the end of March 1952.

A Certification Officer of the status of Assistant Cotton Specialist aided by a special staff of three Inspectors, six fieldmen and six maistris was in charge of the scheme.

The certification schemes helped growers of superior cotton to get better prices. Besides, it kept in check the malpractice of adulteration of inferior with superior cottons and helped to maintain purity of the latter. The co-operation of the grower, the trader and the gin and press owners are quite essential for the success of the scheme.

5. *The Madras Sugar Factories Control Act, 1949.*—(1) The Madras Sugar Factories Control Act, 1949, provides for licensing of sugar factories and regulating the supply and the price of sugarcane used in such factories, etc. The Act was applied from October 1949 onwards in the districts of Visakhapatnam, East Godavari, West Godavari, Krishna, Bellary, South Arcot, North Arcot, Salem, Coimbatore, Tiruchirappalli, Madurai, Chingleput and Tanjore. The Director of Agriculture functioned as the Sugarcane Commissioner under the Act. Fifteen factories got licence but 14 factories worked during the year out of which one worked for a short period only. Details of working are furnished in the Appendix IX.

(2) *Advisory Committee.*—There were two meetings of the Advisory Committee, constituted under the Act, in the course of the year to consider the amendments proposed to the Madras Sugar Factories Control Act, 1949, and the reservation of areas on three to five years basis. The proceedings of the meetings were communicated to Government.

(3) *Special staff.*—For the efficient administration of the Act and rules, Government sanctioned the appointment of six Sugarcane Inspectors with one lower division clerk and two peons each

to function during the sugarcane crushing season. One upper division clerk was sanctioned in the office of the Director of Agriculture, Madras, to cope up with the increase in work during the operation of the Act.

(4) *Price fixation of sugarcane during 1951-52 season.*—This year also the prices payable by factories for sugarcane purchased by them was notified by the Government of India under the Sugar and Gur Control Order, 1950. The price so notified was Rs. 1-12-0 per maund of cane for the season 1951-52.

6. *The Madras Agricultural Pests and Diseases Act.*—The Act was in force in 1951-52 against the following pests and diseases :—

- (i) Broom Rape pest on tobacco in Guntur district.
- (ii) Coffee borer pest in the Nilgiris.
- (iii) Stem Weevil and Pink Boll worm on Cambodia cotton in Coimbatore, Salem, Tiruchirappalli and Madurai districts.
- (iv) Bud-rot of palms in the districts of West Godavari, East Godavari, Krishna and Malabar.
- (v) Red Hairy Caterpillar pest on groundnut and other crops in North Arcot district.
- (vi) Cattle Fly (*Stomoxys Calcitrans*) in Sidhout and Cuddapah taluks of Cuddapah district.

XX. AGRICULTURAL ENGINEERING.

1. The Agricultural Engineering branch was engaged in arranging supply of implements, oil and electric driven pump sets for irrigation and mechanical cultivation units such as tractors and bull-dozers. The application of mechanical aids considerably helped to increase food production and there is increasing demand.

2. *Training*—(a) *Central Tractor Organization, New Delhi.*—Sri K. Natarajan, Assistant Agricultural Engineer, completed his training and rejoined duty in December 1951.

(b) *Agricultural Engineering Training for Agricultural Demonstrators (B.Sc. Ag.).*—The third batch of six Agricultural Demonstrators was trained in Agricultural Engineering at Coimbatore, Madras and Bombay for a period of one year, from March 1952.

(c) Sri K. E. Narayana, Agricultural Engineering Supervisor, and Sri S. E. Kothandaraman, Agricultural Demonstrator, were deputed for training in well drilling under Mr. Riggins in March 1952 as ordered in G.O. No. 180, Food and Agriculture, dated 12th February 1952.

(d) *Scheme for the training of tractors and pump-set drivers.*—With a view to overcome the shortage of trained operators and technical personnel and also to increase the efficiency of the existing drivers, a scheme for conducting training course at the two Agricultural Colleges, Coimbatore and Bapatla, was sanctioned

in G.O. Ms. No. 248, Food and Agriculture (Food Production), dated 21st June 1951. The period of training is for four months and three batches are expected to be trained during a year. The first batch of 23 candidates of whom 13 were departmental candidates completed the course satisfactorily.

3. *Agricultural land development—Investigation of cultivable waste lands in Madras State.*—(1) The special staff consisting of one Assistant Agricultural Engineer, one Agricultural Engineering Supervisor, one Draughtsman and one peon sanctioned in G.O. Ms. No. 258, Food and Agriculture (Food Production), dated 21st December 1950, started the survey, investigation and classification of cultivable waste lands in the districts of Nellore and Ramanathapuram from August 1951. The detailed investigation of compact blocks of waste lands in the district of Salem commenced from 1st June 1952.

(2) The survey work so far conducted in these districts has given very useful and helpful initial data for taking up further necessary investigations in other areas and preparing plans for their reclamation followed by cultivation.

(3) The special staff engaged in the investigation of cultivable waste lands in the State visited 159 villages in the 26 taluks of three districts, viz., Nellore, Salem and Ramanathapuram and localized 73,510 acres of cultivable waste lands. Out of this area 29,735 acres have been found fit for immediate cultivation. It has also been found that 2,036 acres could be brought under cultivation either by lift irrigation from rivers and channels nearby or by forming branches from the existing main channels. The ryots have also expressed their willingness to reclaim 15,963 acres with the aid of departmental tractors and bull-dozers. Based on the detailed survey of available waste lands those that are most suitable for cultivation will be reclaimed by the use of departmental tractors and bull-dozers either by collection of entire cost or by granting loans.

(4) A statement showing the total area localized up to 30th June 1952 and the extent that can be reclaimed and cultivated under the following heads is given in Appendix XII :—

(a) Lands cultivable having facilities for irrigation and parties willing to reclaim;

(b) lands cultivable provided river pumping schemes are sanctioned; and

(c) lands other than (a) and (b).

(5) It is reported that over 10,800,787 acres of waste lands requiring detailed investigation in districts other than Nellore and Ramanathapuram are available to help additional food production in the State. The investigation work is now in progress in Salem district.

(6) The total expenditure on this scheme up to 30th June 1952 is Rs. 7,254.

Tractors.—In Madras State the general use of tractors for agricultural operations in furtherance of the intensive cultivation scheme was initiated as early as 1945. On account of the various advantages, the demand is increasing.

(i) Tractors are useful for ploughing and harrowing fields and also for puddling, incorporating green manure in wet lands. Bulldozers are now regularly employed for reclamation of waste lands and clearance of areas involving levelling and bunding. Re-aligning eroded fields, filling up gullies, clearance of sand cast areas due to flood damage, excavation of tanks, silt removal in tanks and spring channels, etc., are some of the other operations performed by bulldozers. In fact the beneficial and efficient uses for which these modern machinery can be put to saving time and money are varied and many. In reclamation operations, earth moving and other preliminary cultural operations, etc., involve a lot of expenditure and also take much time if carried out with animal or manual power.

The number of tractors increased from 258 to 293. Departmental tractors are now in operation in all the districts of this State as shown in Appendix XIV-A.

According to the recent census of agricultural machinery and livestock conducted in 1951 by the Economic Adviser to the Government, the number of tractors have increased from 23 in 1944 to 624 in 1951 or over 22 fold. The high cost of draught cattle and their relative scarcity in the post-war years are responsible for rapid development of mechanization of agriculture in this country.

There are nearly 624 tractors in this state as against 572 units during the last year as detailed below :—

Government Agricultural department	..	..	293
Other than Agricultural department	..	..	61
Private parties	..	..	254
Co-operative societies	..	..	16
			624

A good number of agriculturists are buying their own tractors.

A statement showing the acreage tackled by the departmental tractors from the period commencing from 1946-47 to 1951-52 is furnished below :—

	1946-47.	1947-48.	1948-49.	1949-50.	1950-51.	1951-52.
Target in acres	..	10,000	43,000	40,000	80,000	1,00,000
Out turn in acres	4,360	10,025	35,589	58,315	66,720	51,983
Number of hours bulldozers worked	11,011	15,525	19,375	38,236	55,344	1,31,220
Additional foodgrains in tons	1,090	2,500	8,892	8,213	7,281	5,487
Number of tractors with and without bulldozers	45	140	152	238	263	293
Number of bulldozers.	27	27	42	60	136	154

(ii) The yard stick adopted in assessing additional production relating to reclamation of virgin lands by use of tractors is one-fourth ton of grain per acre and for the current fallows 1/40 ton of grain per acre. Out of the total outturn of 51,983 acres over 18,613 acres have been newly reclaimed and the rest are old derelict fallow lands left over uncultivated for several years. A statement showing the districtwise outturn of the tractors and bulldozers for the fasli year 1951-52 is furnished in Appendix XIV-B.

(iii) It can be noted from the figures that there has been a progressive development in the turn out of bulldozers used for the preliminary clearance, levelling, bunding and reclamation of waste lands and abandoned areas. Bulldozers were also employed with considerable saving in expenditure and time in clearing cyclone damaged, flood affected and sand cast areas in the districts of Srikakulam, East Godavari, Nellore, Coimbatore, West Godavari, Anantapur, Chittoor and Chingleput. The total area reclaimed was 3,859 acres. It is estimated that about 16,620 acres of sand cast lands have been thrown out of normal cultivation pending reclamation by bulldozers. The demand for bulldozer is increasing and the number of applications pending allotment is 1,892 for the whole State. The total area excavated during the year amounted to 13,491 units. The number of applications pending supply of tractors for ploughing operation is 788. About 3,929 ryots were supplied with tractors and bulldozers.

(iv) Due to rain, ploughing operations and other such works could not be continued continuously without break during the season in the districts of Kurnool, Tanjore, South Malabar, Nilgiris, Araku Valley, South Kanara, North Arcot, Tirunelveli, Srikakulam, Visakhapatnam and Bellary. Due to lack of moisture in the soil, appreciable and reasonable outturn could not be shown in the districts of Cuddapah, Chingleput, Chittoor, Ramanathapuram, Coimbatore, East Godavari, West Godavari, Salem and Anantapur.

(v) During the emergency drought periods, the tractors fitted with belt power attachments were employed for working trailer pumps for irrigating crops. About eight tractor trailer pump units were detailed for service in the districts of West Godavari, Krishna, Nellore, North Arcot and South Malabar for about 1,960 hours.

(vi) As there was progressive increase year by year in the outturn of the tractors, the receipts to the department have also increased. Particulars of total hire charges collected during the last six years are tabulated hereunder :—

	RS.		RS.
1946-47	83,710	1949-50	5,93,431
1947-48	1,25,651	1950-51	11,56,628
1948-49	3,13,788	1951-52	16,88,752

Takkavi loans for tractor ploughing.—There has been a progressive increase in the rate of hire charges of departmental tractors and bulldozers as shown in Appendix XIV-c. The question of

collecting the hire charges under takkavi loan system in three equal annual instalments instead of collecting in cash in full is under the consideration of Government. This system of giving short-term loans for settling the tractor ploughing hire charges has been adopted with success in some of the other States and has enabled poor farmers who are unable to find the ready cash to take to tractor ploughing.

Rotavator demonstration.—Demonstration of tractor attached with the new 'Rotavator' was conducted in the districts of Chingleput, Chittoor, Tanjore, Nellore, Krishna, North Arcot and South Arcot, with great success. It can be worked satisfactorily in comparatively small fields without leaving any unnegotiated head lands and corners. In one operation, it reduces the soil to very fine puddle. Green manure or green leaves can also be ploughed in, in the same operation. This implement can also be used for ploughing and harrowing dry lands and for incorporation of green manure. There was very great demand in Tanjore district for rotavator this year. The average outturn during the useful life of one set of blades would be about 200 to 300 acres when used under dry-land conditions. When used for puddling, these blades may be expected to last much more. The normal output in a day of eight working hours would be about eight to ten acres dry land ploughing or seven to eight acres of wet land puddling. The cost of puddling one acre of paddy field comes to Rs. 8 to Rs. 10 as against Rs. 20 to Rs. 40 at present incurred by paddy growers, adopting the age-long practices with men and cattle.

Agricultural Machinery Advisory Committee.—At the meeting of the Agricultural Machinery Advisory Committee held on 18th September 1951 in the office of the Commissioner of Food Production, Board of Revenue, Madras, it was decided to purchase the following tractors and ancillary machinery :—

	Numbers.
Caterpillar D-6 tractor with bulldozers	19
TD 14 Tractors with bull graders	12
Hanomag tractor with bull grader	2
Service man tool kits	33
David Brown tractor with rotavator	15
Formal tractor with rotavator	5

In their Order Ms. No. 529, Food and Agriculture (Food Production), dated 30th November 1951, Government have sanctioned the purchase of 26 tractors only with necessary equipments at a total cost of Rs. 13 lakhs. These 26 units have been taken over from the suppliers and most of them have been despatched to the districts to which they were allotted.

Assistant Agricultural Engineers (Inspection).—(i) A statement showing the jurisdiction of the different Assistant Agricultural Engineers is shown in Appendix XIV-D.

(ii) The Assistant Agricultural Engineers toured in all for 1,298 days during the year in their jurisdiction. As a result of the frequent and periodical inspections by the Regional Assistant Agricultural Engineers a detailed check and inspection over the various operations, maintenance and outturn of individual machine in their jurisdiction was carried out, in a systematic manner. Prompt attention was also paid to put into commission the machine which required repairs or renewals of spare parts.

(iii) During the year under report the Assistant Agricultural Engineers have given instructions to 734 tractor drivers and cleaners during their tours on correct method of handling and lubricating the machines and explained to them the functions of the various parts and how best to maintain the machines by systematic lubrication.

(iv) The Assistant Agricultural Engineers also helped the district staff in planning and programming tractor service. Some of the tractor-drawn implements which were lying idle for want of spare parts were brought back into service. The log books of tractors were scrutinized monthly and fuel lubricating oil consumption were checked.

(v) The Assistant Agricultural Engineers, Anakapalle and Madurai, have been placed in direct charge of the engineering activities in the districts of Madurai and Visakhapatnam as an experimental measure so as to raise the level of efficiency of operations and maintenance, etc.

A complete list of various types of spares now held in stock for tractors and implements has been prepared for the whole State. This has helped to co-ordinate the indents received from the districts and arrange despatches in a systematic manner from the nearest source available. The department is also endeavouring to see that the manufacturers' representatives also carry the maximum quantity of spares in their central organization in this State.

Tractor training course.—(i) One tractor foreman was deputed to Bombay for undergoing special tractor training course at the newly opened training centre at Powai of Messrs. Larson and Toubre, Limited, Bombay, from 3rd March to 5th May 1952.

(ii) Two Factory Engineers of Bucyrus Erie of United States of America conducted two special courses for the departmental operational staff on the following subjects at the Tractor Workshop, Coimbatore :—

(a) Combination maintenance and service school for operators.

(b) Training of operators and demonstration of equipment in the field for operators and others.

(iii) Films relating to the correct maintenance and operation of Bucyrus Erie bull-graders and dozer shovels with a running commentary in Tamil was shown to the staff. In addition, practical demonstrations on the maintenance and operation were given followed by discussion.

(iv) During the year, free inspections of tractors and attached implements were carried out by the Service Engineer of Messrs. Larson and Toubre, Limited, and Messrs. Volkart Brothers in the districts of Srikakulam, Visakhapatnam, East Godavari, Nellore, Anantapur, Bellary, North Arcot, South Arcot, Tanjore, Tiruchirappalli, Madurai, Tirunelveli, Ramanathapuram, Salem, Coimbatore, North Malabar, South Malabar and South Kanara. The Service Engineers, during the course of "check up" tours, instructed the departmental engineering staff on the correct method of maintenance of tractors and equipment and furnished a list of spare parts required whenever necessary for putting right tractors and implements.

Tungabhadra and Lower Bhavani Project areas.—The departmental tractors and bull-dozers are engaged in clearance of forest areas followed by levelling, ploughing, bunding and other operations required for the resettlement of the displaced persons evacuated from the submerged areas. The total forest area to be cleared is estimated at 3,000 acres. The total extent reclaimed by the use of departmental tractors up to 30th June 1952 is 2,454 acres in Nandibanda and Gunda forest areas.

Departmental tractors and bull-dozers were engaged in reclamation of forest lands at Sundalaikombai block in Lower Bhavani Project from 16th February to 17th May 1952 and reclaimed an area of 576 acres.

Sugarcane development scheme.—(i) For the benefit of sugarcane growers and the general improvement of sugarcane cultivation in this State, the Government of India have sanctioned a sum of Rs. 1,88,844 towards the purchase of tractors and necessary equipment as first instalment of the scheme. A sum of Rs. 94,655 has been spent towards the purchase of four tractors and allied special equipment.

(ii) These units have been distributed as under:—

- (1) The Superintendent, Sugarcane Liaison Farm, Hospet, Bellary district—1 set.
- (2) The Superintendent, Sugarcane Liaison Farm, Nellikuppam, South Arcot district—1 set.
- (3) The Farm Manager, Sugarcane Research Station, Gudiyattam, North Arcot district—1 set.
- (4) Special Agricultural Demonstrator, Vuyyuru, Krishna district—1 set.

(iii) The total outturn of these units is shown below:—

	ACS.
Total area ploughed	444.21
Total area ridged	91.30
Total area harrowed	22.85
Total out turn by the use of cultivators	21.00
Total area of dry ploughing done in paddy fields ..	6.00
Quantity of sugarcane hauled by the use of tractor-trailers	7 tons.
Number of ryots benefited by the use of tractors. ..	79

During the forthcoming crushing season, the tractors with the trailers will be utilized after the day's field work for hauling cane to the factory.

Supply of tractors under hire-purchase system.—Some private agriculturists are very keen to purchase tractors but high cost is the limiting factor. The demand for supply of tractor under the "hire" purchase system is on the increase. The scheme aims at supplying tractors together with matched implements on instalment repayment system.

The total number of applications received up to 30th June 1952 is 142 of which about 63 parties have furnished solvency certificates. In their Orders Ms. No. 191, Food and Agriculture (Food Production), dated 11th May 1951, and Ms. No. 535, Food and Agriculture (Food Production), dated 5th December 1951, Government have sanctioned the supply of only six tractors with matched implements under hire purchase system and they have been supplied to the following parties:—

- (1) Sri M. Munukanniah, Madras (lands in Chittoor district).
- (2) „ Malakonda Reddi, Nellore district.
- (3) „ E. V. Sundara Reddi, South Arcot district.
- (4) „ Pendekanti Venkatasubbiah, Kurnool district.
- (5) „ V. Subbarayan, Madras-Chingleput district.
- (6) Lieut.-Col. M. A. Hamid, Madras.

Out of six tractors supplied under hire-purchase system, only five tractors have been put to actual work, as the sixth tractor supplied to late Lieut.-Col. Hamid has been withdrawn. The total outturn of these five tractors is 634 acres and the crops raised in the reclaimed lands are samai, jonna, horsegram, sugarcane, paddy and ragi.

Loan for purchasing tractors.—Two loan applications for the purchase of tractors with accessories were recommended and forwarded to Government.

Famine relief.—In their Order Ms. No. 174, Food and Agriculture (Food Production), dated 29th April 1952, Government have directed to take immediate steps to provide tanks, etc., for the twenty small-type tractor for distributing water in famine affected areas. Five tractor tanker units have been sent to the Collector of Chittoor and the remaining five units are used as indicated hereunder:—

Collector of Guntur	3
Collector of Coimbatore	2

A statement showing the tractors and implements available with the department from 1945-46 to 1951-52 is given in Appendix XIV-E and F.

A list of machineries and tools purchased during the year under report is shown in Appendix XIV-G.

Experiments.—For the testing of modern implements for seed-bed preparation and studying effects on crop growth one W.D. 9 tractor with four different implements were tried on 13th June 1952 at the Agricultural Research Station, Koilpatti, over five acres divided into five plots. In the fifth plot, the indigenous method was adopted. The ploughing was done by three pairs of work cattle with monsoon plough.

The comparative growth of crop on the five plots is under observation.

Publication.—A hand-book of instructions for the maintenance of tractors and tractor-operated machinery was prepared and approved in G.O. Ms. No. 2436, Food and Agriculture, dated 21st December 1951, and the printing of 700 copies has been arranged at the Government Press, Madras, for free distribution to the staff of the Agricultural Engineering branch and for sale to other departments.

The work of bringing out a similar publication in a more simplified form in different regional languages primarily for day-to-day reference of the tractor drivers has also been taken. This will be priced low and is expected to be of assistance to the operational personnel.

Tractor workshops.—The two tractor workshops started at Coimbatore and Bapatla during the year 1949-50 continued to do useful work in the maintenance, overhauling and repairing tractors, bull-dozers, departmental lorries and agricultural implements, etc., reconditioning and manufacture of several parts were also undertaken. Spares required for different machines in the districts were indented for supply through respective makers' representatives or local producers as the case warranted. Available spare parts were supplied to districts from these workshops.

Tractor Workshop, Coimbatore.—During the year the workshop at Coimbatore was electrified and a power of 25 h.p. was sanctioned for running the machinery. Thirteen new plants and machinery were erected and in addition five new machines were received. Orders have been placed for one small foundry equipment for ferrous and non-ferrous castings. Thirty tractors were serviced and overhauled, 123 spare parts of various kinds were manufactured.

The Assistant Agricultural Engineers in charge of these two workshops were deputed for training in "Mechanised agriculture and maintenance methods" under Mr. Earl K. Rambo, Agricultural Engineering Adviser to the Government of India. A batch of B.Sc. (Ag.) students were trained as Engineering Supervisors. A batch of tractor operators were trained in tractor maintenance and tractor driving.

Tractor Workshop, Bapatla.—During the year six new items of equipment were purchased for the workshop. Over 209 orders for manufacturing 655 spare parts were carried out. About 372 major and minor repairs were done. Servicing and overhauling of

50 units of tractors, implements, pump sets, etc., were done. The Assistant Agricultural Engineer, Bapatla Workshop, also attended the training course, in Mechanised Agriculture at Delhi, under Mr. Earle K. Rambo, the Agricultural Engineering Adviser to the Government of India. The Assistant Tractor Foreman was deputed to Calcutta for training in metalizing equipment at the Indian Oxygen and Acetylene Co., Ltd.

Another tractor workshop for Ceded districts has been sanctioned and arrangements are being made to set up this workshop with headquarters at Bellary so that this area which has great potentialities for mechanized farming may be developed as speedily as feasible. This set up is expected to serve the Ceded districts where even private workshops have not developed to large extent.

Tractors on a co-operative basis.—A new feature of the year is the expansion of tractor ploughing and land reclamation by the co-operative societies in close association with the Agricultural Engineering establishment in some of the districts. Nellore district has taken a lead in acquiring a small group of tractors with implements and is now regularly taking up contract ploughing for cultivators. The Co-operative Marketing Federation in Tanjore has also taken up similar contract ploughing with one of their new tractor. The Chittoor Central Wholesale Co-operative Stores have a programme to start a similar scheme for assisting ryots in their area.

Minor irrigation scheme—Supply of power pumping outfits to ryots.—One of the most important aids given to the ryots for the development of agriculture by mechanical means is the supply of small petrol driven pumping sets and oil engine pump sets for lift irrigation to raise food crops and for well sinking. The demand has considerably increased.

(a) *Petrol driven pumpsets.*—Out of the 792 petrol sets acquired originally by this department during 1946, over 458 sets have been sold to ryots. Most of the remaining sets have served their full time and have become unserviceable. About 35 sets are now useful and they have been regularly let out on hire during the year under report. The balance are awaiting disposal having become unserviceable. There is still a demand for purchase of such units from cultivators but on account of lack of spares they are not taking these sets:—

Number of sets sold during 1946.	14	Number of sets sold during 1950	70
Do.	1947 .. 150	Do.	1951 .. 26
Do.	1948 .. 170	Do.	1952 .. 5
Do.	1949 .. 23	Total	458

(b) *Hiring of oil engines to ryots.*—It was proposed to acquire 250 oil engines for hiring to ryots under the Intensive Cultivation Scheme during the year under report. Accordingly proposals were submitted to Government for the initial purchase of 145 units with

the recommendation of the Machinery Advisory Committee. The details of the 145 units are furnished below :—

Specifications.	Numbers.
(i) 7-10 h.p. diesel oil engine coupled to 4 inches × 3 inches centrifugal pump mounted on trolley ..	75
(ii) 10-12 h.p. diesel oil engine coupled to 5 inches × 4 inches centrifugal pump mounted on trolley ..	50
(iii) 12-14 h.p. diesel oil engine coupled to 6 inches × 5 inches centrifugal pump mounted on trolley ..	10
(iv) 6 h.p. diesel oil engine coupled to 3 inches × 2½ inches centrifugal pump mounted on trolley ..	10
Total ..	145

These oil engine sets have all been acquired and distributed to districts for hiring out to ryots.

Proposals were also sent to Government for the purchase of the remaining 105 oil engines.

(c) *Hiring of oil engines for driving sugarcane crushers.*—

The ryots who grow sugarcane along with food crops require oil engines to drive the sugarcane crushers. This was felt absolutely necessary in cases where the agriculturists use electric power for irrigating food crops. Due to the reduction in supply of electric energy owing to drought conditions, the power supplied in many cases was found only just sufficient either to lift water or crush the canes. In order to help getting over such difficult circumstances proposals were sent to Government for permission to hire oil engines to ryots for driving sugarcane crushers without detriment to the demand for irrigating food crops. Government have permitted the hiring of oil engines to ryots for driving sugarcane crushers at rates specified below :—

For engines up to 16 h.p. Rs. 6 per day of eight hours.

For engines of 16 h.p. and above Rs. 8 per day of eight hours.

(d) *Oil engine distribution by firms.*—During the half-year the following types of oil engines have been sold by the firms direct to agriculturists for agricultural operations either on their own or against the recommendations of the department for outright purchase. The total of 1,368 engines mentioned at the end of the list does not however indicate the complete number of oil engines bought outright by farmers in this State during the year. On account of steep fall in jaggery and sugar prices there was a slight fall in the rate of offtake of these engines by agriculturists. The number of oil engines and pumps used for irrigation purposes has increased from 3,690 in 1944 to 34,027 in 1951 an increase of 9.2 fold. In the central districts where lift irrigation from wells with power pumps is intensively practised. South Arcot contains 3,385 oil engines, Chingleput 2,990, Chittoor 1,928, Coimbatore 1,826, North Arcot 1,646 and Salem 1,446. The number of electric pumps has increased from 4,307 in 1944

to 20,798 in 1951—4.8 fold. In 1951 over 6,939 electric motor pumps were in use in Coimbatore district and South Arcot had 1,499, Salem 1,343 and North Arcot 1,291. In general this census reveals that there has been a considerable increase all round in power lift irrigation. It is, however, interesting to observe that during the 1935 census there were only 3,724 oil engine pump sets and 921 electric motor pump sets for the whole State. Even during the 1940 census there were more oil engine pump sets than electric motor sets but the position reversed in 1944 census, namely, there were more electric sets than oil engine pumping units.

Name of the firm.	Number sold.
1 Messrs. Jayems Engineering Co., Madras	323
2 " Marshall & Co., Madras	319
3 " British & Eastern Engineering Company, Madras.	46
4 " Batliboi & Co., Madras	157
5 " Parry & Co., Madras	273
6 " Greaves Cotton & Co., Madras	85
7 " Textool Company, Madras	72
8 " Crossley Bros., Limited	22
9 " Volkart Bros., Madras	71
	1,368

(e) *Water finders.*—The two water finders acquired by the department during 1950, primarily for experimental and instructional purposes, proved popular and beneficial with ryots when the tests were conducted in South Arcot, Chingleput, Coimbatore, Guntur and Chittoor districts. The demand for the services of these instruments was heavy and all the requests could not be complied with. Hence proposals were sent to Government to purchase 12 more water finders from England at a cost of Rs. 25,000 but the scheme was deferred.

Proposals for the purchase of another six water finders for the Community Project Scheme were submitted to Government in this office No. S-3-867/52, dated 11th May 1952, and the sanction of the Government is awaited.

(f) *River Pumping Scheme.*—The first scheme was started last year by installing power operated pumping sets in groups on the banks of rivers and perennial streams, the water running practically to waste was advantageously utilized for irrigating large extents of lands, cultivated hitherto as dry lands.

The River Pumping Schemes at Pinayur on the Palar and Nelvy Madugu in Chingleput district are working satisfactorily. The cultivators were able to raise paddy successfully all round the year.

The River Pumping Scheme at Matur village in South Kanara district commenced working from 2nd February 1952. Initial operations of levelling, collection of materials, transport of engines and pumps, etc., were in progress for another scheme in South

Kanara district. The River Pumping Scheme sanctioned for Malabar district will go into operation only during the second crop season when scarcity of water occurs in the final stage of the crop growth and also in the third crop season (January to April) when lift irrigation is absolutely indispensable and will be the only source of irrigation. Meanwhile arrangements are being made to get the agreements signed by the beneficiaries of the scheme in accordance with the revised rules laid down by the Government of India.

Government have sanctioned the installation of river pumping sets on the banks of the Kushasthalai and Nagari near Kuppam and Karimbedu villages in Tiruttani taluk, Chittoor district, to provide irrigation facilities to the ryots in the area affected by adverse seasonal conditions for growing food crops and directed that the proposals relating to the installations of pump sets near Samanthavedu village may be taken up after the schemes relating to Kuppam and Karimbedu are completed. About 150 acres of wet lands will be benefited by these two installations.

A similar scheme for the installation of a pump set in the Koteswar temple tank in Coondapoor taluk of South Kanara district has been sanctioned as an experimental measure for one cultivation season for irrigation about 60 acres of lands in Koteswar and Bijady villages to study the degree of response from the beneficiaries.

Sanction has also been accorded for starting the River Pumping Scheme on the banks of the Vaippar near Nemeni village in Ramanathapuram district to provide increased irrigation facilities to the ryots in the area. To begin with, two pump sets will be run in the selected site and the area to be benefited will be confined to 150 acres. Besides this scheme experimental pumping is now in progress at two more places, viz., Paramakudi and Vadamalapuram.

Proposals for the following river pumping schemes have also been submitted to Government and are under consideration :—

District. (1)	Village. (2)	Area to be benefited. (3)	Remarks. (4)
		ACS.	
Malabar	Edabara Ghungathara Chantamporai area. } Nilambur	365 275 215	Additional area to be brought under cultivation is 1,710 crop acres.
Nellore	Vetembedu	240	
	Kudithipalem	200	
			Four hundred and eighty tons of paddy is expected.
			Additional food production of 350 tons per year is expected.

District. (1)	Village. (2)	Area to be benefited. (3)	Remarks. (4)
		ACS.	
North Arcot ..	Kilachur	80	Intended as a famine relief measure.
	Perumugai	80	One hundred and sixty tons of paddy additional production expected.

Ramanathapuram—Vadamalapuram, 150 acres.—A number of similar river pumping scheme in other districts is also under investigation. There are many perennial rivers and streams with copious water-supply in this State which are not at present used to the best advantage. In such areas, construction of large scale reservoirs and dams may not be found feasible.

Financial aspects.—The procedure so far adopted in the case of schemes already sanctioned was that Government would acquire the pumping plants of suitable size and horse power required, install them at the site selected, and run the units with the help of special staff sanctioned for the purpose. The beneficiaries will pay their share of water-rates calculated on the following basis :—

I. Ryots' share—

1 Half of depreciation and interest	..	X
2 Half of the cost of staff	..	Y
3 Full cost of fuel and maintenance	..	Z
		<u>X plus Y plus Z</u>

The pumping charge X plus Y plus Z — A area benefitted.

II. Government share (met equally by the State and Central Government—

1 Half of depreciation and interest	..	X
2 Half the cost of staff	..	Y
		<u>X plus Y</u>

The State Government have since decided that the River Pumping Schemes should be run on a "no profit—no loss" basis, and that the entire charges incurred should be recovered from the beneficiaries.

Government have also decided that hereafter the River Pumping Schemes should be worked only through the co-operative societies to be specially formed for the purpose and that new schemes will be started only if the Registrar of Co-operative Societies is able to form co-operative societies to run them. In the case of River Pumping Schemes already sanctioned however it has been ordered, that if the Registrar of Co-operative Societies is not able

to form any co-operative societies they will be continued to be run by the Agricultural Department provided the beneficiaries agree to meet the entire expenditure.

(g) *Tube well scheme*.—With a view to encourage ryots to raise early nursery for the Kuruvai season in the Tanjore district and also enable them to raise cotton or groundnut in the off-season proposals were submitted to Government for installation of 400 tube wells in Tanjore district. But Government have in the first instance accorded sanction for 100 tube wells with filter points at a cost of Rs. 86,900 (rupees eighty-six thousand nine hundred only) in G.O. No. 566, Food and Agriculture, Food Production, dated 19th December 1951, with one Assistant Agricultural Engineer and with the necessary staff to work the scheme in the Tanjore district. The filter points have to be purchased in advance by the ryots from the stocks kept by the department. The oil engines for working have to be provided by the ryots themselves. The scheme has to be worked on "No profit and no loss" basis in accordance with the new rules prescribed for lift irrigation schemes in general.

The scheme started to function regularly from February 1952. Up to the end of the period under report, borings were tried in 102 places of which 50 cases have proved successful each with a discharge of 10,000 gallons per hour.

Government in their Memorandum No. 6540, Food Production VI-B/52-1, dated 18th March 1952, have called for necessary proposals for the expansion of the scheme for sinking tube wells with filter points in the delta regions of South Arcot, Nellore, Guntur and Godavari and in the Pennar and Vaigai regions. The pilot scheme contemplated for these regions is under preparation. Before formulating this scheme the expert opinion of the Food and Agricultural Organization Ground Water Specialist now attached to the Department of Industries and Commerce has been taken and he is generally in favour of expanding this scheme to other suitable delta zones.

Demonstration of filter points at Agricultural Research Station, Aduthurai, was conducted. One filter point was sent to the Assistant in charge, Agricultural Research Station, Nileshtar, for demonstration. Filter points have also been sent to the Horticultural Society, Teynampet, and Rice Research Station, Tirurukuppam, and they have proved successful at all these places.

(h) *Small boring sets*.—Two power boring sets were purchased from Messrs. Farm Equipment Company, Coimbatore, and these two sets were regularly utilized. Government have been addressed to sanction the purchase of three more small power boring sets with necessary accessories as there is a very great need for them in all the districts for improving the supply in wells.

Electric motors.—Electric motor pumpsets and accessories are now available freely in the market. The primary question of getting service connections to their installations still remains to

be satisfactorily solved and the rate of progress of electric power pumping is now governed by the new connections that are given by the Electricity Department.

The department sought the assistance and co-operation of the concerned Superintending Engineers (Electricity) in this regard.

The total number of electric motor driven pumpsets installed is as follows :—

1949-50.	1950-51.	1951-52.
1,788	1,953	1,723

The reduction in the number of units installed during 1951-52 is mainly due to high supply position of line materials and paucity of giving new connections due to low water-level in Hydro-electric power supply areas:—

(i) *Central Agricultural Engineering Stores and Supply Centre*.—The scheme for the distribution of oil engine and electric motors under hire purchase system which started functioning in October 1949 continued to work during 1951-52 also. The main object is to provide easy credit facilities to poor and middle class agriculturists who are unable to find ready money for investments for installing power lifts for irrigation. Under this scheme, oil engines and electric motor pumpsets of proved durability and with organized servicing facilities are supplied to agriculturists with complete accessories on the hire purchase system. The cost of machinery supplied is recovered in easy instalments ranging over a period of three to five years depending on the total amount involved. The magnitude of the development of power pumping in the State will be more clearly gathered from the statistics published in the 1951 census. The total number of oil engines has increased from 3,690 in 1944 to 34,427 in 1951 over nine times. The number of electric motor pumpsets has increased from 4,307 in 1944 to 20,798 in 1951—an increase of 4.8 fold.

1950-51 *Progress*.—The scheme commenced with a modest target of 1,250 oil engines and 200 motors. Against this target 1,201 oil engines and 191 electric motors were supplied to ryots up to end of 30th June 1952 and these were all mainly employed for paddy cultivation.

1951-52 *Progress*.—To meet increasing demand the distribution of 1,500 oil engines and 500 motors was contemplated during 1951-52. But Government sanctioned the distribution of 625 oil engines and 189 motors as the loan originally anticipated from the Government of India for this scheme did not materialise finally. Subsequently, Government sanctioned the distribution of 240 oil engines and 50 electric motors in their order No. 147, Food Production, dated 5th April 1952, as a famine relief measure in some of the districts. Against the total sanction of 856 oil engines and 239 motors, 600 oil engines and 150 electric motors have been distributed up to end of 30th June 1952.

This is expected to benefit 18,014 acres resulting in an estimated additional production of 9,007 tons of foodgrains.

In 1950-51, the Government of India sanctioned a loan of Rs. 60 lakhs to finance the capital expenditure involved in the purchase and distribution of oil engines and motors. In 1951-52 the same help was not forthcoming in spite of repeated requests. Therefore the target fixed for 1951-52 had to be reduced.

Financial implications.—The expenditure and receipts are given below :—

Expenditure.	Receipts.
RS.	RS.
31,37,215	6,94,436

A sum of Rs. 12,08,929 was due from ryots towards instalments payable on account of pumpsets supplied in 1949-50 and 1950-51. Out of this a sum of Rs. 4,87,863 has been recovered during the period under review.

Staff.—The work involved in the distribution of additional oil engines and maintenance of detailed accounts pertaining to this scheme warranted an increase in the staff sanctioned in G.O. Ms. No. 2447, Development, dated 9th May 1945, and G.O. No. 112, Food and Agriculture (Food Production), dated 26th March 1951. Therefore necessary proposals for the sanction of additional staff have been submitted to Government.

Conclusion.—The scheme which commenced working by the end of October 1949 continued to work satisfactorily during 1950-51 and 1951-52. The scheme commanded wide and popular response from the agricultural section of the public in the State and this may be seen from the comparative figures of applications received in this office from time to time.

Type of machinery.	1949-50.	1950-51.	1951-52.
Oil engine	1,261	1,530	3,216
Electric motor ..	226	310	626

Lorries and Jeeps.—Forty lorries and 30 jeeps were originally acquired from the Thompson Disposals during April 1946 as per G.O. Ms. No. 1538, Development, dated 15th April 1946. Two new lorries were purchased during March 1952 to replace two of the above fleet condemned as unserviceable. The other lorries are now going into frequent repairs of a major type.

In addition to the original strength of 30 jeeps new jeeps were sanctioned during the previous years for the use of the Agricultural Research Station, etc., and the tractor workshops at Agricultural College, Bapatla and Coimbatore. Some jeeps have since become available in the market through the Transport Commissioner and consequently one each for Fruit Research Station, Kodur,

Agricultural Research Station, Guntur, and Agricultural Research Station, Nanjanad, have been purchased during the year. In addition one jeep for each of the Assistant Agricultural Engineer, Tube Wells Scheme, Mayuram, and the District Agricultural Officer, Tellicherry, was purchased during the period under review. Three trailers have also been purchased during the year, one each for the Assistant Agricultural Engineer, Tube Wells Scheme, Mayuram, the Central Agricultural Engineering Stores, Madras, and the Assistant Agricultural Engineer, Soil Conservation Scheme, Bellary. The Department now holds 42 lorries, 41 jeeps (including land rovers), four station wagons and six buses. These transport units are being used exclusively for departmental work. The lorries are sometimes given on hire to ryots for transport of compost manure. The four buses at the Agricultural College, Bapatla, and two at Coimbatore are being used as amenities for the students for educational tours and excursions.

M.B. sheds.—The erection of all the 46 M.B. sheds sanctioned in G.O. No. 2445, Development, dated 22nd June 1946, for proper storage, accommodation of seeds, manures and other agricultural implements at several centres have been completed and they are all in regular use of storage and other purposes. Proposals have been formulated for electrifying certain M.B. sheds so as to provide some minor workshops facilities for repairing the departmental machinery at such centres. The electrification of the M.B. sheds at some centres is being carried on by the Electricity department. The M.B. shed and the attached structures in Bellary have been proposed for conversion into a tractor repair workshops for serving the Ceded districts in general and the Tungabhadra area in particular. This is now pending sanction of Government.

XXI. STATE TRADING SCHEMES.

The State Trading organization in the departmental was concerned during the year with the schemes for purchase and distribution of (1) chemical fertilizers, (2) iron and steel for agricultural implements and (3) pipes and fittings for irrigation purposes.

(1) *Chemical fertilizers—Ammonium sulphate.*—In previous years, there was generally a shortage of supply of both ammonium sulphate and superphosphate but in 1950, however, a plentiful supply of both ammonium sulphate and superphosphate was allotted by the Central Government to this State. On account of the increase in the supply of ammonium sulphate during 1950, coupled with the failure of seasonal rains, there was a balance of about 55,000 tons left over with the department at the beginning of the year 1951. (On 1st January 1951) taking the stock on hand, Government of India was approached for the supply of 65,000 tons of sulphate of ammonia during the year 1951. Unlike in the previous years when the allocation were primarily made for food crops, separate allotments

were made for other crops such as sugarcane, cotton and for manure mixing firms. The following are the allotments made for different crops during 1951 :—

	TONS.
For food crops	114,000
For manure mixing	17,000
For cotton	1,000
For sugarcane	5,000
	137,000

Against the allotted tonnage of 65,000 the actual receipt by the State Government during 1951, was only 38,611 tons. The supply position in the latter months (October to December 1951) when the demand was very high was very unsatisfactory due to non-arrival of shipments at the Madras Harbour according to schedule. There was a great demand for the supply of ammonium sulphate all over, but the entire demand could not be met on account of want of stocks. Besides, the Government of Madras continued as per their agreements to take direct from Messrs. Fertilizers and Chemicals, Travancore, Limited, the stipulated 40 per cent of their production of ammonium sulphate. A quantity of 8,487 tons of ammonium sulphate was supplied by them during 1951 (from January to December 1951) against their production of 18,492 tons.

Superphosphate.—The quantity of superphosphate allotted for the year was 28,000 tons against which orders for supply of 21,676 tons were placed. The full quantity of superphosphate was supplied from different factories within the Indian Union. The supply was held up in the earlier part of the year due to want of raw materials like sulphur, rock phosphate, etc. But from June onwards, the situation somewhat eased and the factories began to produce superphosphate fairly steadily. The need for popularizing the phosphatic manures was keenly felt and the subsidy scheme introduced from 1st April 1949 according to which super was sold to agriculturist at half the cost was continued throughout the year.

The Agricultural department entrusted with distribution of manures and iron and steel, etc., as an emergency measure, was freed of this trading activity and 14 tender firms and numerous co-operative organizations were allowed to distribute the chemical fertilizers allotted to this State on 50 : 50 basis. There were nearly 1,400 retail sales depots of the co-operative societies and the tender firms in the whole State.

Manure mixing.—The manure mixing firms had to face competition from straight fertilizers. Further, ammonium sulphate stocks were released to mixing firms on replacement cost basis, i.e., at FACT rate which is higher than the central pool price and no

subsidy was given to them for superphosphate. On account of these facts they could not make as much progress in pushing on sale of mixtures. Against 34,000 tons of sulphate earmarked for allotment to manure mixing firms during the previous year, 1950, the offtake was only 12,000 tons. But in 1951, however, there was considerable demand for ammonium sulphate from manure mixing firms and they requested for an allotment of 20,000 tons of ammonium sulphate. Government of India were approached for supply of an additional quantity of 5,000 tons for use by manure mixing firms and they were supplied with some extra quantity. The total offtake by the manure mixing firms during the year amounted to 16,733 tons of ammonium sulphate and 5,111 tons of superphosphate.

Distribution.—The sales affected by the Agricultural department during the year 1951-52 through their depots, by the tender firms and co-operative societies, etc., as compared with the previous years are furnished hereunder.

	1951-52.	1950-51.	1949-50.	1948-49.	1947-48.
(1)	(2)	(3)	(4)	(5)	(6)
	TONS.	TONS.	TONS.	TONS.	TONS.
Ammonium sulphate ..	80,401	83,188	54,444	50,658	33,982
Superphosphate ..	14,028	13,968	14,321	3,950	2,806

The demand from agriculturists for supply of artificial fertilizers has been steadily on the increase, for the past five years ever since the department undertook to do both work of propaganda and distribution. The application of such concentrated fertilizers is becoming more and more common for different kinds of crops in all districts. Crop sampling tests conducted in different districts have distinctly proved that such intensive and concentrated manuring is definitely profitable to all crops.

Scheme for effective control and test of samples of manure mixtures.—The effective control of quality of artificial manures in manure mixtures of various kinds is necessary. There has been a steady growth and expansion of manure mixing trade in this State. It is, therefore, necessary to have suitable regulations to ensure that the ryots who purchase manure mixtures are assured of the supply of the right quality of mixed fertilizers at reasonable rates. The Government sanctioned a scheme for the effective control of quality of mixed fertilizers. The scheme is running its third year and since October 1951, the control of quality has been extended to include straight fertilizers as well. This scheme is intended to ensure that the correct grades of manure mixtures are marketed by the manure mixing firms and that the manures are up to specifications as marked on the bags or as per analysis guaranteed and manure mixtures and straight fertilizers coming under the Central Fertilizer Pool are sold at rates approved by this department. A special staff of inspectors and analysts has been appointed. The gross-mixing yards and sale depots are periodically inspected the gross-weight of and wordings on bags are verified, licences, stock books and bill books are checked by the special staff. Samples are taken and analysed and action taken if any deficiency is noted in the guaranteed analysis. There are at present 21 manure mixing firms

in the approved list and the number of brands of proprietary manure mixtures marketed by them is about 200.

During the year, 5,311 depots were inspected and 563 samples taken for analysis. Data regarding the non-compliance with the provisions of the manure mixtures quality and price control order are furnished in the Appendix XIII.

There are now 22,841 licensees distributing manures of various kinds. The special staff employed for effecting proper check and implementing the provisions of the Madras Manure Dealers Licensing Order, 1949, and Madras Manure Mixtures Quality and Price Control Order, 1950, has been able to detect a large number of defaulters and educate the licensees to rigidly conform to the provisions of the orders cited. As far as the manure mixing firms are concerned, they have been observing the provisions of the above orders and there is little room for complaint. But in the case of straight fertilizers, especially in the case of oil mills and dealers in oil cakes the state of affairs is not so satisfactory. A good lot of persuasion is required to get the wholehearted co-operation of the evaders and some more time will be required to secure compliance with the provisions of the control orders. More powers are necessary if the provisions of the Control orders have to be enforced effectively and the offenders brought to book speedily. Proposals for comprehensive legislation on the model of the Fertilizers and Feeding Stuffs Act of the United Kingdom in place of the Madras Manure Dealers Licensing Order, 1949, and Madras Manure Mixture Quality and Price Control Order, 1950, have been submitted to Government.

(2) *Iron and steel*—(a) The scheme for the distribution of iron and steel to agriculturists was introduced as one of the activities of this department in the third quarter of 1944, in furtherance of the "Grow More Food" campaign and as a part of the Government's plan to make available to ryots their iron and steel requirements at fair prices.

(b) The work connected with the distribution of fabricated implements has since been transferred to co-operative societies in G.O. No. 6250, Development, dated 17th December 1948. The selected co-operative societies were directed by Government to take over the stocks of implements from the agricultural depots for sale to ryots. The response of the societies was not however, satisfactory and hence this department continued the sales in the depots of these old stocks so that they may all be cleared. Further acquisition of fabricated implements was stopped by the department and the fabricators were directed to effect distribution through the societies in their respective districts.

(c) In G.O. No. 34, Food and Agriculture (Food Production), dated 4th July 1950, Government ordered the transfer of the work relating to the supply of iron and steel such as cart tyres, axles, galvanized iron and steel corrugated sheets and other categories to co-operative societies. The acquisition of the abovementioned raw materials has been stopped but only the planning of

the demand for iron and steel is done by this department at present. This has relieved the department of the physical handling of iron and steel.

(d) The supply position of cart tyres is now satisfactory but there is still some difficulty in getting adequate stocks of galvanized sheets of the plain and corrugated varieties rounds and small squares and black sheets needed for making mamooty blades and pans.

(e) Consequent on the transfer of work relating to the distribution of iron and steel and agricultural implements to the co-operative societies the materials stocked in the various agricultural depots remained unsold. Steps are being taken for the speedy disposal at current market rates as ordered in G.O. No. 101, Food and Agriculture (Food Production), dated 15th March 1951, and at reduced rates as ordered in G.O., Food and Agriculture (Food Production), dated 18th December 1951. A large quantity of these old stocks have now been liquidated and only a small stock is still left over.

(f) *Implements and machinery*.—In addition to supplying agriculturists regularly with approved and popular types of implements and machines, investigation on the suitability of special machines designed in other countries for agricultural operations in this country were carried out. The following are some of the new machines under experimentation and research :—

(1) Dania Threshing machine, (2) groundnut picker and re-cleaner, (3) Massey Harris self-propelled harvester combine, (4) Danish Hay press, (5) Royer compost, shredder mixer and (6) Kennels automatic oscillator sprayer.

(3) *Pipes*.—The procurement and delivery position of pipes and fittings have shown appreciable improvement when compared with previous years. A total quantity of 760,516 feet of pipes was received during the year and distributed to various district centres.

The department is obtaining pipes on quarterly allotments as recommended by the Ministry of Agriculture, New Delhi, from the Iron and Steel Controller, Calcutta, since the second quarter 1949. These pipes are sold to ryots without loss to Government as envisaged in G.O. No. 73, Food and Agriculture, on a "no loss and no profit" basis. A total quantity of 256,138 feet of pipes was distributed to the agriculturists by this department.

STATEMENT SHOWING THE DETAILS OF INDENTS.

Allotment and supply of pipes for third quarter 1951 to second quarter 1952.

Period.	Indent.	Allotment.	Supply received.	Balance due.
(1)	(2)	(3)	(4)	(5)
Third quarter 1951 ..	311,000	117,718	117,718	..
Fourth quarter 1951 ..	168,000	91,000	91,000	..
First quarter 1952 ..	287,900	491,652	386,684	104,968
Second quarter 1952 ..	302,000	245,114	165,114	80,000
	1171,900	945,484	760,516	184,968

XXII. FINANCE.

The expenditure and receipts for the financial year 1951-52 and the corresponding figures for the previous years are given below :—

	1950-51. IN LAKHS.	1951-52. IN LAKHS.
1 Expenditure 40. Agriculture	275.35	316.49
2 Receipt XXIX. Agriculture	117.95	110.95

1. *Expenditure—Agriculture.*—There has been an overall increase of expenditure amounting to Rs. 41.14 lakhs during the year under report. About Rs. 24 lakhs of increased expenditure relate to seed multiplication schemes control of crop and Plant Protection Scheme, Scheme for multiplication and marketing of Co. 1, cotton combined scheme for the multiplication and distribution of Co.4/B.40 and K.2 cotton seeds, and expenditure on activities of the department in connexion with demonstration and propaganda. Under Agricultural education there was an increase of expenditure by about Rs. 1.88 lakhs of which Rs. 1.73 lakhs relate to the acquisition of land for the Agricultural College, Bapatla. The agricultural engineering activities account for an increase of about Rs. 13.4 lakhs. The main increase is due to the revival of Contour Bunding Scheme to the full extent and the purchase of agricultural machinery such as oil engines and pumpsets for mechanical cultivation, tractor cultivation schemes and expenditure on central agricultural engineering and supplying centre. There was an increase of nearly Rs. 1.01 lakhs in the expenditure under agricultural experiments and research. This is mainly due to general increase in expenditure on the scheme for improvement of pulses, the scheme for eradication of bud rot disease of palms and the scheme for the production of improved strains of millets and to the payment of subsidy for compost. There is a general increase of about Rs. 0.85 lakh on other items on account of the expansion of the activities of the department all round.

2. *Receipts—XXIX. Agriculture.*—The decrease during the year is due to the fact that the receipts in 1950-51 included a large recovery from the Central Government on account of food production schemes. There was no such recovery during the year under report.

XXIII. SALIENT FEATURES OF THE ACTIVITIES AND OUTSTANDING ACHIEVEMENTS DURING THE YEAR 1951-52.

Season.—The season was adverse for agricultural production in the Central and Southern districts of the State for the fifth year in succession.

Agricultural education.—One hundred and twenty-three graduates passed out of the two Agricultural Colleges but only 35 could be absorbed in the department. Three graduates passed out in first class.

Research—Agricultural chemistry.—Reversion of superphosphate in laterite soil could be retarded by the application of bulky organic matter like green manure and cattle manure and lime. Alkaline soils in Cauvery-Mettur Project area could be reclaimed by application of heavy dressing of green leaf (10,000 lb. per acre) S.R. 26 paddy strain is found to be faring well. Heavy or light irrigations did not affect the salt concentration in top layers in the black soils of the Tungabhadra Project area and hence there is no fear of rise of salts to the surface by irrigation.

Plant physiology.—Pre-soaking seeds in nutrient solutions has given very encouraging results in increasing crop yields and the work is being pursued under a scheme in an intensified form. A quick method of determining viability of seeds as against the traditional germination test, has been worked out and made available to the Seed Development Staff.

Agricultural entomology.—Intensive studies with the synthetic insecticides DDT, BHC, HETP and Parathion were pursued but a new feature was the trial of systematic insecticides Pestox, Isopestox, etc., which when sprayed or applied along with irrigation water was found to be absorbed and retained by plant tissues and on that account become toxic to a few groups of crop pests over a fairly long period. Rhinoceros beetle grubs in manure heaps could be effectively destroyed by BHC spray or dust. Parathion spray (0.025 per cent) is found to be a specific against coccid pests. Ragi root aphids (*Tetraneura hirsuta*) which could not be controlled so far could now be controlled by dusting BHC dust of 5 per cent strength. The after-effects of applying BHC and DDT on vegetables indicate that these insecticides have to be avoided or used with great caution only. Seeds with high oil-content were found to retain large quantities nearing the injurious limit of DDT, BHC and Calcium cyanide when these were used for preserving the seeds against insects in storage. For the orange tree borer clipping of wilted shoots and/or insecting petrol was found to be very effective in controlling the pest.

Agricultural Mycology.—In co-ordination with Paddy Specialist three promising blast resistant strains were spotted. Colloidal copper is the best fungicide for soil treatment against the incidence of Ginger rhizome rot and wilt. During the year the permanent farm for Ergot production was opened in the Nilgiris and 30 acres were sown with rye.

Crops—Paddy.—Seven more improved strains were released for distribution and are expected to serve about a lakh of acres. About 350 tons of seeds of improved strains from seed farms and about 200 tons of seeds for drought affected areas were supplied. It is found that superphosphate is better supplied to the green manure crop proceeding paddy than direct to the paddy crop itself.

Millets.—Five new millet strains were released for distribution. Over 90,258 lb. of improved seeds were supplied to seed farms from Coimbatore.

Pulses.—Despite adverse seasonal conditions for the past five years, culture 37 in redgram, greengram, culture 62, blackgram culture 212, horsegram culture 35 and Bengalgram culture 94, have done well in the southern districts. Redgram culture 97, blackgram 189 and horsegram 76 and 93 have done well in the Circars.

Oil seeds.—One strain of groundnut (TMV.4) was released for distribution. Cattle manure was found to increase yield of groundnut crop in drought years. Tractors with suitable implements were tried for the first time for harvest of groundnut and were found to be useful. 'Tikka' or leafspot disease could be controlled by spraying with Bordeaux mixture or dusting with sulphur. Over 35,000 lb. of groundnut and 163,390 selected seedlings of coconut were distributed.

Cotton.—Cotton strain 7,682 found better than MU.1 was released as MU.2. In the Tungabhadra Project black soils, a strain GI. X.Co.-2-9-3 (Laxmi) is found promising both under irrigated and rainfed conditions. Sea Island cotton trials in West Coast continue to be promising. Cultivation of early varieties of cotton in the rice fallows of Tanjore is very promising and P. 216F has covered large area wherever irrigation facilities are available during summer. A cotton growers' co-operative society was formed in Tanjore for helping the cultivators in marketing their produce. Cotton seed storage trials indicate that unsold stocks of seeds could be sown in subsequent seasons provided their viability is kept up.

Sugarcane.—Seven new Coimbatore canes were found promising in preliminary trials. Organic form of nitrogen was found better under low moisture conditions. Trash twist method of propping canes was found useful and economical. DDT spray (0.32 per cent) is found to reduce borer infestation and reduce mortality of shoots. From the experiments conducted in sugarcane liaison farms the following canes were found suitable for factory areas:—

		Early.	Mid-season.	Late.
Samalkota	..	Co. 537 } Co. 475 }	Co. 449	..
Hospet	..	Co. 449 } Co. 475 }	Co. 449	..
Nellikuppam	..	Co. 527 } Co. 471 }	Co. 449	Co. 619
Kulittalai	..	Co. 527 } Co. 471 }	Co. 449	Co. 467

Fruits.—Four more promising mango hybrids were added to the existing collections. Pabutan and Olour, poly embryonic mango varieties were found to be good as root stocks for Baneshan and Neelum. Sathugudi orange trees budded on their own seedling root stock are found to yield superior quality fruits. Spraying apple trees with linseed oil or Sandobin 'A' during dormant

period is found to hasten blossoming and promote yield. In breadfruit significant increase in fruit size has resulted by dusting the female spike with its own pollen or jack pollen. Three promising varieties of tomato with determinate habit, which eliminates staking of plants, have been introduced from Canada. Two hybrid and two mutants in Banana have been produced.

Pepper.—The site for the new pepper research station was acquired. Preliminary studies indicate that productivity of pepper vines depends, upon the degree of hrmphorditism present in pepper varieties and hence there is great scope for selection of suitable planting material for producing high yielding pepper plantations.

Cardamom.—In controlling the cardamom thrips, the worst pest of cardamom, spraying DDT (0.25 per cent) is found to be as effective as dusting with BHC or spraying with Nicotine sulphate.

Systematic Botany.—The handbook on weeds was revised and is under print.

Agricultural Engineering Research.—Tractors provided with suitably designed guntaka are found effective in harvesting groundnuts. Howards rotovator tried for the first time last year was given further trials during the year and is found to be suitable for puddling paddy lands.

Agro-Industries.—The Government Malt Factory worked on profit for a second year in succession and there is a progressive increase in off-take of malt extract by medical institutions.

Simplification of the processing procedures in canning fruits and vegetables was done through the use of the latest type of glass containers known as clamp on jars and through the regulation of the PH value of the canned material and/or the covering syrup of brine.

Soil conservation.—In the districts of Bellary and Anantapur good progress was made in contour bunding and trenching. About 3,496 acres were contour bunded as against 874 acres last year. Contour bunding over an area of 17 acres was done in Chittoor district as a famine relief measure. A scheme for soil conservation in the Ketti Valley of Nilgiris was prepared.

Tungabhadra Project area.—Arrangements for supply of green manure and other improved seeds for levelling land and for opening of demonstration farms to illustrate cropping of irrigated dry lands were in progress. They will be put into effect as soon as water is made available in the project area next year.

Colonization schemes.—Special problems of agricultural colonies and extension work among the colonies received attention.

Propaganda, Publicity (Extension work).—Relieved to some extent from the State Trading Scheme work, the extension staff made best efforts in the implementation of the intensive cultivation

schemes for food production cotton extension and sugarcane development, etc. In the food production plan as against a target of 378,294 tons of additional production of foodgrains 273,250 tons is estimated to have been produced. In cotton extension plan an additional production of 20,000 bales have been estimated to have been produced despite the prevalence of adverse seasonal conditions for the fifth year in succession.

Improved seeds.—Large quantity of improved seeds of paddy, millets, pulses, cotton and oil seeds was distributed during the year.

Manures.—Green manure seeds were distributed on a very large scale. Besides planting of sesbania along with paddy on the margins of fields for supply of green leaf and seeds was popularized in all districts. A special intensive manure scheme for manuring paddy with sulphate of ammonium and superphosphate was launched for the second year and interest-free loans to the extent of 71 lakhs rupees were granted to enable poor cultivators to take to manuring.

Plant protection.—Plant protection service has become very popular with the public. During the year 785,628 acres of food crops, 80,775 acres of other crops and 408,479 fruit and other economic plants were saved from loss due to the attack by pests and diseases. It is estimated that 21,674 tons of foodgrains have been saved by the plant protection service.

Agricultural marketing.—Two reports on the marketing of fish and cattle were published. With the formation of market committees for Ramanathapuram and Tirunelveli districts there are 13 regulated markets dealing with the commercial crops, viz., cotton, groundnut, tobacco, arecanut and coconut grown in the State. Help was rendered to co-operative marketing societies and other departments. Prices of agricultural produce and market conditions were constantly studied and reviewed.

Agricultural Engineering.—Agricultural Engineering activities have extended greatly and Special Assistant Agricultural Engineers have been appointed in the districts to inspect and check the work of tractors.

Investigation of cultivable waste lands.—The special staff inspected and located 73,510 acres of waste lands in the districts of Nellore, Salem and Ramanathapuram. Of these, 29,735 were found to be fit for immediate cultivation.

Tractors.—Twenty-five more tractors were added on to the existing fleet and 51,983 acres were ploughed with tractors. The lower outturn is due to the prevalence of adverse seasonal conditions for the past five years. Special Assistant Agricultural Engineers exercised inspection over the work of tractors and there was considerable improvement in their work. Six tractors were sanctioned on hire-purchase system. Four special tractors were acquired and used for sugarcane development in factory areas and over 444 acres were ploughed, 91 acres ridged and 44 acres inter-cultivated.

Power pumping outfits.—Supply of oil engines on hire for irrigation was continued with an additional 145 units. Erection of oil engines and electric motors was aided by supply of pipes and technical assistance required by ryots. The hire-purchase system of supply of oil engines and electric motors was continued and 600 oil engines and 150 electric motors were supplied to applicants. River pumping schemes started in Chingleput and Ramanathapuram have become very useful and popular. There is great demand for these schemes as the lands benefited have no other possibilities of getting irrigation from any projects in the near or distant future. The tube wells scheme started in Tanjore district provide a cheap and assured early supply of water for raising Kuruvai nurseries and for cultivation of cotton, groundnut or other crops in the rice fallows during summer. over 60 filter point tube wells have been sunk.

State trading schemes.—The departmental activities in State trading is confined to acquisition of stocks of chemical manures, iron and steel and allotment to tender firms and co-operative societies. Pipes and fittings were acquired and distributed through the department.

M. S. SIVARAMAN,
Director of Agriculture.

APPENDICES

APPENDIX I.

Five-year plan—Main Agricultural Schemes, 1951-56.

	Target of additional product, on for five years (tons).	Cost involved	
		Loan Rs. (Lakhs).	Subsidy Rs. (Lakhs).
I. Land reclamation—			
(a) Mechanical cultivation with tractors and bull-dozer	149,375	106	109.38
(b) Tractors on hire-purchase system	74,000	60	0.54
(c) Land improvement by contour bunding, drainage, gully plugging, soil and water conservation	7,945	..	35.00
II. Minor irrigation programmes—			
1. Pumping installations—			
(a) Oil engines on hire	654,839	54.00	18.30
(b) Procurement and sale of pipes and arrangement for installation of electric motors and oil engines		..	46.80
2. Supply of oil engines and electric motors on hire-purchase system		329.50	2.16
3. River pumping schemes		50.00	80.00
4. Tube well scheme		..	2.00
III. Distribution of manures and fertilizers—			
1. Ammonium sulphate + super phosphate	1,448,333	400.00	2,452.46
2. Town compost	20,558*	..	2.25
3. Rural compost	14,300	..	5.73
4. Green manure	1,72,823	..	6.19
IV. Distribution of improved seeds—			
(a) Paddy	378,854	..	751.26
(b) Millet	101,104	..	54.68
(c) Pulses	2,760	..	3.62
V. Plant protection	..	..	78.75
VI. Cotton extension	750,000 (Balca)	..	83.71
VII. Sugarcane research and development	3,158,000 (millable cane).	..	9.51

* For three years (1951-54) only.

APPENDIX II.

Statement showing the figures of acreage and yield of food crops in the Madras State in 1951-52.

Crop.	Area. acs.	Yield. tons.	Remarks.
Cereals—			
Paddy	9,873,000	6,007,000	Yield in terms of unhusked grain.
Cholam	4,529,100	937,100	
Cumbu	2,122,000	417,900	
Ragi	1,429,300	503,500	
Korra	1,387,800	168,400	
Varagu	847,000	254,100	
Samal	501,000	68,300	
Maize	37,200	15,500	
Others	384,800	72,800	
Total, cereals	21,131,600	8,444,000	

Crop.	Area. acs.	Yield. tons.	
Pulses—			Yield in terms of unhusked grain.
Greengram	467,800	42,600	
Redgram	351,800	39,100	
Blackgram	281,000	30,600	
Bengalgram	117,500	17,700	
Horragram	1,356,400	87,500	
Others	232,400	14,700	
Total, pulses	2,806,900	232,200	
Sugars—			Production in terms of gur or jaggery.
Sugarcane	259,590	682,400	
Others	74,100	57,410	
Total, sugars	333,690	739,810	
Fruits and vegetables including root crops—			
Mangoes	261,000	667,590	
Plantains	159,850	1,162,360	
Onions	54,400	221,500	
Other fruits and vegetables	393,800	1,262,290	
Total fruits and vegetables including root crops	869,050	3,313,740	
Miscellaneous food crops	49,910	15,540	
Total, food crops	25,191,150	12,745,890	

NOTE (a).—The figures of area and yield in respect of paddy, cholam, cumbu, ragi, korra, varagu, samal, maize, greengram, redgram, blackgram, bengalgram, horragram, sugarcane and onions are according to the final forecast reports for 1951-52. Information in respect of other crops is based on rough estimates.

(b) The figures of yield of cereals and pulses are in terms of unhusked grain. The estimated loss of weight in husking is 33 per cent for paddy, 15 per cent for cholam, 20 per cent for cumbu, and korra, 10 per cent for ragi, 40 per cent for varagu and maize, 45 per cent for samal, and 20 per cent for other cereals and for pulses.

(c) Figures for condiments and spices are not furnished as was done in previous years as the 'condiments and spices crops' group has been deleted from the list of food crops and included under 'non-food crops' at the instance of the Government of India, effective from the Season and Crop Report for 1950-51.

APPENDIX III.

Details of area of rice yield, etc., on Agricultural Research Stations in 1951-52.

Name of the research station.	Area planted in acres.	Yield per acre of bulk area.	Normal yield on the station.	Nucleus seed distributed.	Remarks.
(1)	(2)	(3)	(4)	(5)	(6)
1 Paddy Breeding Station, Coimbatore	28.0	1,800	3,000	21,000	
2 Agricultural Research Station, Maruteru—					
First crop	42.0	2,980	2,900	70,900	
Second crop	19.8	2,780	2,200		
3 Agricultural Research Station, Pattambi—					
First crop	58.3	2,050	2,150	143,150	
Second crop	52.2	1,880	2,000		
Modan	13.0	980	900		
4 Rice Research Station, Tirurkuppam—					
First crop	5.6	2,540	3,000	89,800	
Second crop	16.2	2,100	2,500		
N. varai	2.8	1,400	2,000		
5 Paddy Breeding Station, Mangalore—					
First crop	17.4	2,480	2,070	85,250	
Second crop	11.6	1,890	1,650		
6 Agricultural Research Station, Aduthurai—					
First crop	24.0	3,400	3,000	133,850	
Second crop	12.0	3,000	2,500		
Samal	24.0	2,800	2,000		
Thaladi					

Details of area of rice yield, etc., on Agricultural Research Stations in 1951-52—cont.

Name of the research station.	Area planted in acres.	Yield per acre of bulk area.	Normal yield on the station.	Nucleus seed distributed.	Remarks.
(1)	(2)	(3)	(4)	(5)	(6)
7 Rice Research Station, Ambasamudram—					
First crop	8.2	3,700	3,500	1,100	
Second crop	8.15	2,800	3,000		
8 Rice Research Station, Buchireddipalem.	10.0	1,500	2,500	7,500	
9 Other stations	..	..	..	2-4,300	
		Grand total ..		756,350	

The total of 756,350 lb. or about 350 tons is sufficient to raise 14,000 acres of primary seed farm area.

APPENDIX IV.

Programme of work for 1952-53.

Research.—Research activities of the Department will be diverted towards problems of integrated production plan and with this end the following programme for 1952-53 is drawn up.

Agricultural Education and Training.—The admission into the Agricultural Colleges at Coimbatore and Bapatla will be kept at 80 each. Horticultural training for 20 agricultural and Botany graduates will be continued.

Agricultural Chemistry.—Studies in reclamation of alkali soils, laterite soils, green manuring of paddy, soils under irrigation in Tungabhadra and Lower Bhavani Project area, marginal land reclamation with legumes will be continued. Experiments in permanent manurial plots, compost in Agricultural Research Stations and laboratory trials for release of phosphate for super and rock phosphates for crops through lime and green leaf, studies in geochemistry of soils, pH determination of paddy soils, foliar diagnosis, fungal diseases, soil microbiology, soil fertility with reference to manurial requirements under ryots conditions in Tanjore will be pursued.

Plant Physiology.—Vernalisation studies, pre-soaking seeds in nutrient solutions, effect of hormones on growth and yield of food crops will be continued. Effect of trace elements on plant growth will be pursued. Studies in water requirements and salt tolerance of paddy, investigations into lodging of paddy and seed viability tests will be continued.

Agricultural Entomology.—Investigation into crop pests with a view to control them in the laboratory and field will be done. The efficacy of BHC, DDT and other synthetic and systemic insecticides at different strengths for control of pests will be tested. Their toxicity, residual and adverse effects will be studied. Biological control measures against the Nephantis, fluted scale woolly aphis, sugarcane borers will be continued. Investigations into different aspect of bee-keeping as swarm control, queen bee rearing, bee enemies, improvement of hives and comb foundations as per technical programme will be pursued. Systematic work on lepidoptera, Coccid, Aearina, etc., will be done.

Agricultural Mycology.—Investigations into diseases of food commercial and other important crops will be pursued. Help will be extended to breeders in evolution of strains resistant to paddy blast, cereal rusts, blackarm of cotton, ragi, blast, etc. Investigation into diseases of ginger at Pattambi in collaboration with the Paddy Specialist will be continued and stem breaking disease of Areca will be investigated. Fungicidal trials and systematic work will be pursued.

Production of Ergot will be taken up at the new farm at Ootacamund and possibilities of production at Singarpatti and Araku investigated.

Systematic Botany.—Identification of plants survey of flora and taxonomic research will be continued. Studies in fodder grasses, forage, green manure, cover crops vetiver and medical plants will be pursued. Introduction of economic plants as cow tree, water nuts, camphor, eucalyptus varieties will be done. Storage trials and germination tests will be continued.

Cytogenetics.—Cytogenetical studies in paddy, millets and horticultural crops and plants allied will be continued. Chromosome numbers of cultivated crops and their wild species and

Agricultural Engineering Research.—Testing of new implements and machinery received from firms will be continued. Possibilities of adopting indigenous implements to the tractors

will be pursued. Investigation into the cost of working of tractors, oil engine pumpsets, electric-motor pumpsets and causes for idle hours of tractors will be pursued. Draft on implements and water table studies will be continued. Mechanised cultivation of paddy and groundnut and other crops will be pursued to study possibilities in this direction.

Agro Industries.—The Pilot factory for malt production will be continued. Fruit preservation and canning research will be pursued to explore the possibilities of canning and preservation of indigenous fruits as canned fruits, juice, squashes, cordials, jams, jellies, marmalades dry and candied products. Demonstration work in fruit products and preservation will be continued.

Efforts will be made to complete the installation of the fruit products plant for research.

Agricultural Marketing.—Market survey reports will be brought up-to-date, report on rice will be written. Grading work on egg, ghee, orange, potato, jaggery and other products will be continued and amplified. Grading will be introduced for arecanut fruits, rice and coconut oil. Establishment of regulated markets in the districts of North Arcot and Tiruchirappalli and more market yards in Coimbatore, Bellary, Arantapur and Malabar will receive attention. The Help, advice, and guidance will be extended to the Market Committees established under the Madras Commercial Crops Markets Act. Co-operative marketing will be encouraged. Reporting on market prices of important commodities and review of market conditions will be continued. Help and advice will be given to other departments in matters relating to marketing.

Agricultural Colonisation Schemes.—Possibilities of introducing profitable crops and practices will be examined and propaganda for application of proved improvements will be done at the Araku Valley and Wynad Colonies.

Soil Conservation.—Contour bunding in Ceded districts and in Chittoor district will be continued. Research in soil conservation methods with a view to collect further data on soil erosion and conservation will also be initiated. Soil conservation measures in Nilgiris will be tried.

Tungabhadra Project—Irrigation Research.—The irrigation research will be continued to explore the possibilities of growing crops under irrigation in the black soils.

Bhagawadi demonstration farm will be continued and two more demonstration farms in the project area will be established.

Crops—Improvement work.—Evolution of high-yielding strains resistant to pests and diseases and suited for different environmental conditions by well-known and modern methods of plant breeding will be the main work in all crops. Introduction from other parts of India and abroad, of varieties and types and multiplication of pedigree seeds for large scale distribution will be pursued. In addition, the following special lines of work will be pursued in different crops.

Paddy.—Evolution of flood resistant types suited for Kollair lake region and saline resistant types for saline tracts of the State. Work on blast resistant strains will be intensified.

Manurial trials with composts, superphosphate with and without ammonium sulphate and green manure will be continued.

Fundamental work on inducing mutations by X-ray, chemicals and hormone treatments will be pursued. Studies on wild rices and their crosses with the cultivated types will be continued.

Millets—Cholam.—Improvement of grain size wherever desirable, introduction of juicy stalk instead of pithy stalk varieties, reduction of duration in rainfed sorghums, evolution of striga resistant types and agronomic and other methods for control of striga will be specially pursued.

Ragi.—Improvement of protein and vitamin content of grains, reduction of duration in strains and studies in diseases resistance will be continued.

Tenai.—Evolution of rust resistant strain will be pursued.

Cumbu.—Utilization of hybrid vigour in cumbu which is naturally cross pollinated, for increasing yield has been proved beyond doubt with the evolution of two hybrids x.1 and X 2. This work will be intensified and extended. The hybrid seed will be multiplied for large scale distribution. Fundamental work in the genetics of millets will be also pursued.

Pulses.—Besides evolution of improved strains in pulses, red, black, green, bergal and horse grams, mixed cropping trials with cereals, oil seeds and cotton will be pursued. Trial of exotic pulses received from Indian Agricultural Research Institute, New Delhi, evolution of types from cow pea, cluster beans, lab-lab suitable for use as vegetable, multiplication of seeds of promising culture of C. 37, 97 (redgram), C. 127 (greengram), 189 (blackgram) and C. 468 (bengalgram) and others will be taken up.

Oil-seeds.—Groundnuts.—Besides evolution of strains, manurial trials for finding the optimum dose of potash and phosphatic acid for groundnut, different cultural treatments as preparatory tillage, rotation and mixed cropping, harvesting and curing trials and mechanical cultivation with tractors will be pursued. Multiplication of improved strains and control of Surul and Tikka by the use of insecticides and fungicides on a large scale will be done.

Gingelly.—Spacing trials and multiplication of promising types will be done. Evolution of white seeded type will be pursued.

Castor.—Hybridization and purity studies will be pursued.

Cocmuts.—Manurial and cultural experiments will be continued. Trials of different subsidiary crops in coconut gardens will be continued. Studies in planting depth, oil and copra contents and under planting will be pursued. The nurseries for production of selected seedlings and distribution to the public will be continued.

Studies on correlation of characters of the coconut palm with yield, inheritance, button sheeding and Rhinoceros beetle attack will be pursued.

Cotton.—Besides evolution of strains for different regions and environment and cosmopolitan strains having higher yield, increased staple length and ginning percentage will be specially attempted in all schemes of improvement in cotton. Trial of sea island cotton in the West Coast in open and under shade will be pursued in an extended manner. Trials on fixing suitable early varieties of cotton for the rice fallows in Tanjore district will be intensified and extended. Studies in perennial and wild cottons, heterosis, and parthenogenesis in cotton and genetics of cotton will be pursued. Seeds of all strains will be multiplied in a pure form for large scale distribution.

Sugarcane.—Trial with sugarcane varieties (co-caness) from the Sugarcane Breeding Station, Coimbatore, will be continued both at the Agricultural Research Stations, Anakapalle and Gudiyattam. Manurial experiments, cultural trials and studies of cane under water-logged conditions will be continued.

Chemistry and Physiology of the sugarcane will be studied at Anakapalle. Studies on imposing cane trash and jaggery making will be pursued.

Studies in sugarcane diseases, especially smut and Redrot will be pursued at Anakapalle. Studies in sugarcane pests and biological control of borers will be continued at Coimbatore.

The development schemes at the Liaison Sugarcane Farms in Samalkot, Nellikuppam, Mittalai and Hospet will be continued.

Fruits for the plains.—Varietal collection and maintenance of performance records of individual trees will be continued in all fruits. Root stock studies in mango and guava will be continued. The new root stock trials for Sathugudi orange, lemons and guavas will be continued. Studies on flowering in relation to age and growth of shoots and blossom biology in mango will be continued. Classification and nomenclature of citrus, studies on bud sports and top working trials in citrus and mango will be continued. Trials with Guava and hybridization in mango, citrus and guava will be done. Reduction of economic plants and studies in propagation methods in different fruits will be pursued. In the Government Nursery, Kodur, promising fruit varieties will be multiplied for large scale distribution.

Hill fruits.—Varietal collection, propagation and trial of root stocks, pruning and training trials with apples, peach, plum and prunes will be pursued at Coonoor and pollarding trials with plum will be continued. Studies on pyrethrum and strawberry and collection of new varieties of vegetables will be made at Kallar and Burliar gardens. Cacao, agosteen, bread fruit, etc., will be multiplied for supply to the public. Hybridization in fruit plants will be intensified.

Banana.—At the Central Banana Research Station, Aduthurai, varietal collection, selection of mutants, determination of suitable suckers, for planting, optimum time of planting will be pursued. Ratooning and mattocking trials and manurial experiments on banana will be pursued. Cultural problems of perennial banana will be pursued in respect of desucker, thinning, manuring and soil cultivation.

Potato.—Introduction and trial of new varieties, manurial trials, trials with liming early and late planting, rotation and contour planting will be continued.

Chillies.—Evolution of a thrips resistant strain of chilli, better than G-1 in yield, pungency and colour retention will be attempted under the scheme of chilli improvement work at Panniyur.

Pepper.—Varietal collection for selection of high yielding types and study of diseases of pepper will be done at Panniyur where land have been acquired for the new pepper research station.

Cardamom.—The work of isolating better strains of cardamom and measure for control of cardamom pests and diseases will be continued.

Ginger.—Investigation into cultivation and diseases of ginger will be carried on at Pattambi.

Tapioca and sweet potato.—Trial of varieties, manure and cultural experiments as per technical programme of the scheme will be pursued.

Propaganda and publicity (extension work).—Five year National plan. All the intensive cultivation scheme included in the Five-year National Plan will be pursued as per targets fixed.

The Community development projects and Ford Foundation training centres will be worked in co-operation with the Director of Community Projects.

General.—The extension staff in the district will frequently tour villages, hold meetings deliver lectures, carry out demonstrations and stage exhibitions on all important occasions where cultivators gather in numbers. Serious attempts will be made to form Agriculture Associations and Advisory Committee in many centres.

Trials of improved strains evolved in paddy, millet, pulses, oil-seeds, cotton, sugarcane, etc., in trial, observation and demonstration plots will be continued.

Seeds of improved strains found suitable to the districts will be multiplied in seed farms and made available to the cultivators.

Better conservation of cattle manure in pits, byres and loose boxes will be popularized. Rural compost making will be intensified and compost week celebrated. Town compost will be popularized with a view to break down the prejudice against its use. Green manuring especially with *Sesbania speciosa* and *Gliricidia maculata* will be pushed through as per targets fixed.

Cultivation of fruit plants, vegetables and subsidiary food-crops will be encouraged.

Firka Development.—Work will be continued in the selected firkas with the staff sanctioned for the purpose.

Bee-keeping.—In the districts will be popularized with the special maistries sanctioned for the purpose in the districts of Srikakulam, Visakhapatnam, East Godavari, West Godavari, Krishna, Guntur and Chittoor.

Loans for purchase of seeds, manures and implements will be issued on a more liberal scale. Special loans for purchase of ammonium sulphate and super phosphate for application to first crop paddy in selected districts will be granted.

Plant protection work will be continued with the aid of the special staff. Depots will be stocked with the required pesticides, dusters and sprayers.

Cotton extension work involving introduction of improved strains, manuring of irrigated cotton with ammonium sulphate and mixed cropping with chillies, groundnut, ragi, extension of cultivation in rice, fallows and control of pests will be pushed through as per targets fixed.

Vanamahotsava will be celebrated commencing from 1st July 1952 all over the State. The required seed material for planting will be got ready in time. Propaganda will be carried on for the after care of saplings planted.

Publicity.—The Grow More Food Journals in the four regional languages Tamil, Telugu, Malayalam and Kannada will be continued to be published. The Villagers' Guide and Calendar will be published in all the regional languages. Leaflets on important agricultural subjects on topical interest will be distributed as occasion demands. Popular hand books on crops will be published.

Radio talks on agricultural subjects will be arranged to be broadcast from the All-India Radio stations at Madras, Kozhikode, Vijayavada and Tiruchirappalli.

Agricultural news letter and press communiques will be issued on interesting current agricultural topics.

Agricultural exhibitions and shows will be organized in connexion with local festivals and political, social and religious meetings. Demonstration with the improved implements and machinery and preparation and preservation of fruit products will be held on all such occasions.

Agricultural engineering.—All the Agricultural Engineering Schemes included in the intensive cultivation plan for Five-year National Plan will be pursued as per targets fixed.

Tractors.—Mechanical cultivation with tractors will be further extended by addition of more tractors with necessary equipment as part of the Five-year National Plan. Large-scale demonstration with Rotavator with David Brown tractor will be carried out in North Arcot, Chittoor, East Godavari, Guntur and Tanjore districts. Issue of tractors on hire purchase system will be continued. Reclamation of forest areas in Tungabhadra and Lower Bhavani Project areas will be continued. All aids for mechanical cultivation will be given. Necessary training classes and inspection will be arranged.

Power pumping units.—Hiring of oil engines, pumpsets, their sale directly and through firms will be continued. Erection of electric motor pumpsets will be extended by arranging for supplies. Prospective underground water resources with water finders will be studied.

Tube-wells.—The work of sinking filter point in all delta regions will be pursued to explore possibilities of supply of water for irrigation during summer for cultivation of crops in rice fallows.

Hire purchase system (CAES).—Oil engine and electric motor pumpset on hire purchase system to enable poor cultivators to take to power pumping units as part of the Five-year National Plan will be distributed.

State Trading Scheme.—The State Trading Schemes will be wound up and the concerned accounts will be closed. The purchase of pipes and fittings alone will be continued under the scheme.

2. Chemical fertilisers.—Under the Five-year National Planning Programme 1951-56, it is proposed to arrange for distribution the undermentioned quantity of chemical fertilisers in 1952-53:—

1952-53, Ammonium-sulphate, 120,000 tons.

3. Control of manure mixtures.—The work of effective control on manure mixtures marketed by manure mixing firms will be continued and expanded if necessary.

APPENDIX V.

Statement showing the progress of grading work in Madras State during the year 1951-52 (July to June).

Serial number, name of the authorized packer and centre.	Grading during 1950-51.			Grading during 1951-52		
	Quantity.		Estimated value. RS.	Quantity.		Estimated value. RS.
	MDS.	SBS.		MDS.	SBS.	
<i>Ghee.</i>						
1 Sri P. Srinivasa Rao, Ongole.	178	17	40,957	757	6	1,29,186
2 Messrs. Amarchand Gulabchand & Co., Tirupur.	5,888	2	11,03,720	3,919	20	7,09,245
3 Messrs. Dhanalakshmi & Co., Tirupur.	1,290	38	2,59,207	1,591	20	3,10,145
4 Messrs. Lakshmidas Premji, Guntur.	1,688	33	3,22,582	280	11	50,965
5 Messrs. A. S. M. Arunachala Nadar & Co., Madurai.	..	..	..	34	1	6,248
Total ..	9,046	10	17,28,466	6,582	18	12,05,789
<i>Potatoes.</i>						
1 Ketti Growers United Corporation, Ketti.	4,200	..	46,500	..	..	..
2. N. R. Rangaswamy Naidu and Sons, Ketti.	..	..	..	8,750	..	1,28,373
3. Sri M. N. Ponnuswamy, Mettupalayam.	..	..	..	..	..	..
Total ..	4,200	..	46,500	8,750	..	1,28,373
1950-51						
Total value ..	Rs. 19,44,771		1951-52.			
			14,78,719			

Statement showing the progress of grading work in Madras State during the year 1951-52 (July to June).

Serial number, name of the authorized packer and centre.	Grading during 1950-51.		Grading during 1951-52.	
	Quantity. Nos.	Estimated value. Rs.	Quantity. Nos.	Estimated value. Rs.
Eggs.				
1 Messrs. Eggs and Poultry Mart, Madras.	50,440	33,805	785,697	1,07,280
2 Messrs. M. M. Ebrahim Brothers & Co. Madras.	459,445	54,381	69,727	6,567
3 Sri M. Rajoo Chettiar, Madras.	16,633	20,530	40,608	5,581
4 Sri K. N. Govindaswami Pillai, Madras.	8,795	1,077	18,563	2,256
5 Sri V. C. Inasu, Ootacamund.	51,347	6,199	15,793	1,922
6 Katpadi Co-operative Egg Marketing Society, Katpadi.	186,807	22,229	149,763	18,618
Total ..	1,126,467	1,38,221	1,080,151	1,42,224
Fruits.				
1 Kodur Fruit Growers Co-operative Society, Rajampet.	278,192	33,584	20,062	2,326

APPENDIX VI.

List of Agricultural Schemes in progress in Madras State during 1951-52.
(a) Scheme financed by the Indian Council of Agricultural Research.

Number and name of the scheme.	Place of working.	Officer-in-charge.	Object of the scheme.
1 Fruit Research Scheme.	Kodur (Cuddapah district).	Superintendent, Fruit Research Station, Kodur.	Horticultural improvement fruits such as mangoes, citi grapes, guavas, etc., sapota, with special reference to variety propagation and manuring, etc.
2 Banana Scheme.	Aduthurai (Tanjore district).	Banana Research Officer.	For research work on Bananas the State classification, breed and improvement work.
3 Scheme for investigation of orange borer in Wynad (closed during the year).	Do.	Government Entomologist, Coimbatore.	To find out suitable preventive remedial measures for orange borer.
4 Scheme for improvement of hill fruits.	Coonoor (Nilgiris).	Assistant Fruit Specialist, Coonoor.	To carry out improvement in fruits of the Nilgiris.
5 Scheme for training of Agricultural and Botany graduates in Horticulture.	Coimbatore ..	Fruit Specialist, Coimbatore.	To give special training in Horticulture extending over a year. Agricultural and Botany graduates to provide trained personnel man Horticultural Research extensional schemes.
6 Scheme for the establishment of Model orchard cum Nurseries in the State.	Selected districts of the State.	Fruit Specialist ..	To establish model orchards and nurseries which will serve as visual demonstration centres of Scientific orchard practices nursery maintenance in an economic way.
7 Scheme for scientific aid to the Pepper industry.	Penniyur (Malabar district).	Pepper Specialist ..	For improvement work in pepper by selection and hybridization and to investigate into the cause of the 'Polli' diseases.
8 Scheme for research in Ginger cultivation.	Malabar ..	Government Mycologist.	For research in varietal manuring, preservation, and diseases of ginger.
9 Scheme for scientific aid to cardamom industry in South India.	Singampatti (Tirunelveli).	Cardamom Specialist.	To produce better types cardamom by breeding and disease control measures cardamom pests.
10 Scheme for the multiplication and distribution of Hybridumbu strains.	Coimbatore district ..	Millets Specialist ..	To multiply on a large scale our hybrid strains which have hybrid vigour.

List of Agricultural Schemes in progress in Madras State during 1951-52—cont.

(a) Scheme financed by the Indian Council of Agricultural Research—cont.

Number and name of the scheme.	Place of working.	Officer-in-charge.	Object of the scheme.
11 Scheme for research into control of striga in cholam.	Guntur-Nandyal	Do.	To evolve a high yielding striga resistant cholam strain and to investigate control measures against the parasite.
12 Scheme for improvement work on chillies.	Guntur	Assistant Research Officer, Agricultural Research Station, Guntur.	To evolve a high yielding striga resistant chillies better than G-1 and to investigate control measures for striga on chillies.
13 Scheme for research in pulses.	Coimbatore, Salem and Visakhapatnam.	Pulses Specialist, Coimbatore.	To evolve high yielding types of pulses, resistant to disease and having bold grain, attractive colour and good cooking quality. Redgram, blackgram, greengram, bengalgram, cowpea and lablab are tackled.
14 Scheme for investigation of blast and foot-rot disease of rice.	Coimbatore	Assistant Mycologist, Coimbatore.	To control blast and foot-rot by resistant varieties and use of fungicides.
15 Scheme for co-ordinated crop weather studies in Madras State.	Selected Agricultural Research Stations in Madras State.	Agricultural Meteorologist, Coimbatore.	To study the relationship between weather and crop growth, occurrence of pest and disease, etc.
16 Scheme for varietal and agronomic trial to determine optimum yield.	Tanjore	Assistant Agricultural Chemist, Tanjore.	To conduct simple manual experiment and oil survey.
17 Scheme for investigation of possibility of pre-soaking seeds in nutrient salt solution.	Coimbatore	Plant Physiologist, Coimbatore.	To investigate the possibilities of pre-soaking seeds in nutrient solution for improving crop yield.
18 Scheme for research on cashewnuts. (Not commenced.)	South Kanara	Fruit Specialist	To undertake research in cashewnuts in the State varieties, cultivation method, etc.
19 Scheme for regional bee research station in Madras State.	Coimbatore	Government Entomologist.	To investigate into the possibilities of improving the Indian Honey bee.
20 Scheme for crop cutting experiments on paddy, millets, oil seeds, etc. and for statistical assessment of the results due to Grow More Food aids.	Madras State	Deputy Director of Agriculture (Crop Sampling, Madras).	To work out the normal yields of food crop, paddy, millets, oil seeds etc., and to assess the effect of the Grow More Food aids on production in the State.
21 Scheme for improvement of sweet potato and tapioca	Pattambi Coimbatore, Bapatla of Madras State.	Paddy Specialist	For improvement work in sweet potato and tapioca by breeding and manuring.

(b) Schemes financed by the Indian Central Cotton Committee.

1 Schemes for the improvement of Mungari cotton in Madras State.	Adoni (Bellary district).	Assistant Cotton Specialist, Bellary.	For evolving a strain from Mungari cottons having the quality of Westerns suitable for red and black oils.
2 Scheme for improvement of Kakinada.	Narasaraopet and Gurjala (Guntur district).	Assistant Cotton Specialist, Narasaraopet.	Evolution of an improved strain with reddish brown lint, medium staple and fair ginning percentage of 30 per cent good fibre strength and higher yield.
3 Scheme for multiplication and distribution of C-1 and 336 B Cotton in Guntur district.	Guntur district	District Agricultural Officer, Guntur	To multiply and distribute pure seeds of C-1 and 336 B Cotton
4 Scheme for the breeding of long staple cotton, Madras.	Palur and Srivilliputtur (Ramanathapuram district).	Assistant Cotton Specialist, Srivilliputtur.	To evolve a long staple cotton suitable for cultivation in the State.
5 Scheme for breeding Cambodia Cotton in Ceded districts.	Siruguppa, Hagari and Nandyal.	Assistant Cotton Specialist, Siruguppa.	To explore the possibilities of replacing local type by a suitable American cotton to suit black soil of the region under irrigation.
6 Scheme for improvement of Tintal and Karungani Cotton.	Kolipatti	Assistant Cotton Specialist, Kolipatti.	To evolve a co-mopolitan Karungani type with high ginning percentage and staple length.
7 Scheme for improvement of Western Cotton.	Hagari	Assistant Cotton Specialist, Mungari Scheme is in-charge of this also.	Evolution of better type of Western cotton than the present Western.
8 Scheme for the breeding of long staple American Cotton as winter crop for Central Districts and Sea Island Cotton for West Coast.	Tiruchengode, Avanezhai, Srivilliputtur, Nilakshwar, Pattambi, and Coimbatore.	Assistant Cotton Specialist, Winter Cambodia Scheme, Coimbatore.	To evolve a long staple American type suitable for cultivation as a winter crop in Central districts and conducting trial of Sea Island cotton in the West Coast.

(b) Schemes of financed by the Indian Control Cotton Committee—cont.

Number and name of the scheme.	Place of working.	Officer-in-charge.	Object of the scheme.
9 Scheme for improvement for White Northern Cotton.	Nandyal	Assistant Cotton Specialist, Nandyal.	To supply pure seeds to cotton growers and to increase the staple length and spinning value of Northern.
10 Scheme for the breeding of unirrigated Cambodia cotton in Periakulam.	Periakulam, Madurai district.	Assistant Cotton Specialist, Kolipatti.	To breed a suitable irrigated Cambodia cotton suitable for Coimbatore, Salem, Tiruchirappalli and Madurai districts.
11 Scheme for maintenance of nucleus of pure seeds of improved cotton strain.	Coimbatore	Cotton Specialist, Coimbatore.	To produce selfed seeds of all improved strains Co. 2, Co. 3, and Co. 4, Co. 5 and 4463.
12 Scheme for the improvement of G-1 Cotton in Guntur district.	Guntur district	District Agricultural Officer, Guntur.	To multiply and distribute pure seeds of G-1 cotton and to make available a better cotton spinning for mills.

(c) Schemes financed by the Indian Central Sugarcane Committee.

1 Scheme for Sugarcane Research in Madras State.	Anakapalle and Gudiyatham.	Sugarcane Specialist, Anakapalle.	To select useful strains of high yielding canes suited to different cane tracts of the State and for carrying out research in physiology, chemistry and diseases of sugarcane.
2 Scheme for Research on Sugarcane Borer, and other pests and the biological control.	Coimbatore and Nellikuppam.	Government Entomologist.	For research on sugarcane pests with reference to growth of cane weather conditions and parasites, of the cane borers with a view to control them.
3 Sugarcane Developmental Scheme—Liaison Sugarcane Farms.	Samalkot, Hospet, Nellikuppam and Kulitthalai.	Sugarcane Specialist.	For increasing the yields of sugarcane round about the sugar factories.

(d) Scheme financed by the Indian Central Oil Seeds Committee.

1 Scheme for improvement of coconut in East Godavari district. (Not commenced.)	East Godavari district.	Oil-seeds Specialist, Coimbatore.	To effect improvement in coconuts grown in the Northern Circars by breeding, manuring and cultural methods.
2 Scheme to run six zonal nucleus seed farms of improved oilseeds.	Madras State	Do.	For large scale multiplication of pure seeds of improved strains of oilseeds.
3 Scheme for large scale trials of insecticides and fungicides to control surul and Tikka diseases of groundnut.	Tindivanam	Do.	For control of surul pest and Tikka leaf spot disease by use of insecticides and fungicides.

(e) Schemes financed by the Indian Central Coconut Committee.

1 Scheme for research of coconuts in Madras State. (Terminated on 31st March 1952.)	Nilakshwar	Oil-seeds Specialist, Coimbatore.	Research on economic and practical aspects of coconut to establish certain criteria for selection of seedlings that would ultimately yield well and study of button shedding and production, etc.
2 Scheme for establishment of coconut nurseries in the State.	Coimbatore, Tindivanam, Anakapalle, Maruteru, Aduthurai, Pattukkottai, Pattambi, Nilakshwar, Marudur and Samalkota.	Do.	To produce and supply good quality seedling to the public on a large scale.
3 Scheme for multiplication of crotalaria striata. (Since terminated.)	Malabar	Do.	To produce and distribute seeds of crotalaria striata for cultivation in coconut gardens.

(f) Schemes financed by the Madras Government alone.

1 Scheme for the multiplication of Co. 2 and K. 5 cotton strain.	Coimbatore district	Assistant Cotton Specialist, Tiruppur.	To multiply and distribute pure seeds of Co. 2 and K. 5 cotton strains on large scale.
2 Scheme for purchase and distribution of H-1 cotton seeds in Bellary.	Bellary district	District Agricultural Officer, Bellary.	To purchase pure seeds of H-1 cotton strains and supply to the districts of Bellary, Anantapur, Kurnool and Cuddapah.
3 Combined scheme for multiplication and distribution of Co. 4 and K-2 cotton.	Madurai, Tirunelveli and Ramanathapuram districts.	Assistant Cotton Specialist, K-2 and Co. 4 Cotton Scheme, Kolipatti.	To multiply and distribute on a large scale pure seeds of K-2 and Co. 4 cotton strain in Madurai, Tirunelveli and Ramanathapuram districts.

Number and name of scheme.	Place of working.	Officer-in-charge.	Object of the scheme.
(f) Schemes financed by the Madras Government alone—cont.			
4 Scheme for the investigation of land development and reclamation of waste lands in the State.	Whole State	Joint Director of Agriculture.	To survey and draw up a plan of reclamation of fallow and weed infested lands in Bellary district by tractors.
5 Scheme for the opening of regional Millets Research Sub-Stations.	Ariyalur, Tirupattur, Ongole and Ramana-thapuram.	Millets Specialist, Coimbatore.	To evolve new strains of improved millets suited for different millets regions of this State.
6 Scheme for multiplication of 881 F. Cotton.	Kurnool	District Agricultural Officer, Kurnool.	To multiply and distribute seeds of 881 F. Cotton in the Munari areas of Kurnool district.
7 Scheme for multiplication and distribution of M.U.I. Cotton in Winter Cropped areas of Coimbatore district.	Coimbatore	Assistant Cotton Specialist, Tirupur.	To multiply and distribute pure seeds of M.U.I. Cotton in winter cropped areas of Coimbatore district.
8 Scheme for multiplication of improved gingelly seeds.	.....	Oil-seeds specialist ..	To multiply and distribute improved seeds of gingelly.
9 Free distribution of vegetable seeds.	Whole State	Director of Agriculture, Madras.	To encourage the cultivation of vegetables in schools and other similar institutions.
10 Scheme for multiplication and distribution of H. 8, 9 and G.I. Chili seeds.	Guntur	District Agricultural Officer.	To multiply and distribute pure seeds of H. 8, 9, tobacco seeds and G.I. Chili seeds.
11 Free distribution of seed materials of sweet potato, tapioca and kurkan.	Do.	Do.	To encourage the cultivation of subsidiary food crops and sweet potato, tapioca and kurkan.
12 Tungabhadra project localization of ayakut.	Ceded districts ..	Do.	To demarcate areas suitable for different crops and cropping.
13 Scheme for biological control of coconut pests.	Razole	Plant Protection Officer (Entomologist).	To breed and release parasite black headed caterpillar pest of coconuts for controlling pest.
14 Scheme for eradication of white borer of coffee.	Nilgiris	Government Entomology.	To eradicate the white borer of coffee.
15 N. 14 Certification Scheme.	Kurnool district ..	Assistant Cotton Specialist, Nandyal.	To issue certificate on purity of Northern 14 Cotton to enable it to get exemption from price control.
16 Co. 4. Certification Scheme.	Coimbatore, Tiruchirappalli, Salem, Madurai, Ramana-thapuram and Tirunelveli districts.	Certification Officer, Rajapalayam.	To issue certificates of purity of Co. 4 to enable it to get exemption from price control.
17 Development of Fruit Industry in the Kodakanal.	Kodakanals (Madurai district.)	Fruit Specialist ..	To improve the fruits industry in Kodakanals.
18 Citrus root stock ..	Kodur	Superintendent, Fruit Research Station, Kodur.	To find out suitable type of root stocks.
19 Scheme for training additional fieldmen and maistries.	Whole State	Director of Agriculture.	To provide additional trained fieldmen and maistries for extension work.
20 Opening of an Agricultural Research Station, Sathyamangalam.	Coimbatore district ..	Government Agricultural Chemist.	To study problems arising out of the Lower Bhavani Project in Coimbatore district.
21 Scheme for study of laterite soils.	Agriculture Research Station, Pattambi.	Do. ..	To find out the suitability of laterite soils for paddy cultivation.

(g) Schemes financed partly by the Government of India.

Number and name of scheme.	Place of working.	Officer-in-charge.	Object of the scheme.
1 Cotton extension plan for production of cotton in 1951-52—employment for the one year special staff.	Madras State	Cotton Extension Officer, Coimbatore.	To provide special officers for increasing the production of cotton by (1) Extension of area, (2) manuring with ammonium sulphate, (3) mixed cropping with oil seeds chillies, and ragi and (4) use of improved seeds.
2 Scheme for the control of pests of cambodia cotton.	All areas in Madras State where cambodia cotton is grown.	Plant Protection Officer (Entomology), Coimbatore.	To combat pests on cambodia cotton by distribution of pesticides at half cost.
3 Scheme for the mixed cropping of Irunga cholan with indigo as a crop preceding cotton.	Tirunelveli and Ramana-thapuram districts.	Cotton Extension Officer, Coimbatore.	To extend cotton cultivation by encouraging mixed cropping of Irunga cholan and indigo as a crop preceding cotton.

(g) Schemes financed partly by the Government of India—cont.

Number and name of scheme.	Place of working.	Officer-in-charge.	Object of the scheme.
4 Scheme for the cultivation of cotton in rice fallows of Tanjore, Tiruchi, Rapalle and South Arcot districts.	Tanjore, Pattukkottai, Tiruchirappalli and South Arcot.	Cotton Extension Officer Coimbatore.	To cultivation short duration cotton in the rice fallows of Tanjore, Tiruchirappalli and South Arcot district.
5 Intensive Cultivation Schemes given below.	Whole State	Director of Agriculture and Joint Director of Agriculture.	To produce increased food grains as per target fixed.
1 Rural compost making.		Director of Agriculture.	.....
2 Plant Protection Schemes.			
3 Production and distribution of improved seeds of paddy.			
4 Production and distribution of improved seeds of millets.			
5 Production and distribution of improved green-manure seeds.		Joint Director of Agriculture.	.....
1 Oil engine pumpsets ..			
2 Electric motor pumpsets.			
3 Tractor cultivation ..			
4 Central Agricultural Engineering stores.			
5 Distribution of ammonium sulphate.			
6 Distribution of phosphate fertilizers.			
7 Soil conservation Scheme, Nilgiris.			
8 Soil Conservation by Contour bunding in Ceded Districts.		Madras State .. ..	.....
9 Intensive Manuring Scheme.			
10 Scheme for effective Control and test samples of manure mixture production.	Madras State	Madras State	To have effective control of manure mixture production as to ensure reasonable price paid for them.

APPENDIX VII.

Appointments, postings and transfers of Gazetted Officers.

Post.	Period.		Name of the officer-in-charge.
	From	To	
Director of Agriculture	(Throughout.)		M. S. Sivaraman.
Joint Director of Agriculture (Engineering).	Do.		B. M. Lakshminpathi.
Joint Director of Agriculture (Extension).	1 Apr 1952 ..	To date. ..	M. Kanti Raj.
Personal Assistant ..	1 July 1951 ..	6 Oct. 1951 ..	V. Rangachari.
Do. ..	7 Oct. 1951 ..	18 Nov. 1951 ..	T. Natarajan, Gazetted Assistant additional charge.
Do. ..	19 Nov. 1951 ..	21 Feb. 1952 ..	W. G. Janakiraman.
Do. ..	22 Feb. 1952 ..	To date ..	V. Venkatarayudu.
Headquarters Deputy Director of Agriculture (Inspection).	1 July 1951 ..	To date ..	V. K. Subramania Mudaliar.
Headquarters Deputy Director of Agriculture (Propaganda).	1 July 1951 ..	19 July 1951 ..	M. Kanti Raj.
Do. ..	20 July 1951 ..	27 July 1951 ..	V. K. Subbrmania Mudaliar. (additional charge.)
Do. ..	28 July 1951 ..	21 Oct. 1951 ..	V. T. Subbiah Mudaliar.
Do. ..	22 Oct. 1951 ..	31 Mar. 1952 ..	M. Kanti Raj.
Do. ..	1 Apr. 1952 ..	.....	Post kept in abeyance.
Headquarters Deputy Director of Agriculture (Research).	(Throughout.)		Dr. K. C. Naik,
Gazetted Assistant ..	Do.		T. Natarajan.

HEADQUARTERS—cont.

Post.	Period.		Name of the officer-in-charge.
	From	To	
State Marketing Officer	1 July 1951	10 Feb. 1952	S. N. Venkataramana Iyer
Do.	11 Feb. 1952	10 June 1952	S. S. Katchapeswaran.
Do.	11 June 1952	To date	S. N. Venkataramana Iyer.
Assistant Marketing Officer (Chemical Manures).	(Throughout.)		D. Shanmugasundaram.
Inspector of Fertilizers	Do.		G. K. Chidambaram.
Assistant Agricultural Engineer (Inspection), Headquarters.	1 July 1951	7 Nov. 1951	S. E. Anantaraman.
Do.	8 Nov. 1951	14 Nov. 1951	P. K. Radhakanth (additional charge).
Do.	15 Nov. 1951	To date	P. Rajavadan.
Assistant Agricultural Engineer II (Headquarters).	1 July 1951	20 Dec. 1951	P. K. Radhakanth.
Assistant Agricultural Engineer III (Headquarters).	21 Dec. 1951	To date	S. E. Anantaraman.
Assistant Agricultural Engineer (C.A.E.S.)	1 July 1951	29 Feb. 1952	C. R. Shanmugam.
Do.	1 Mar. 1952	6 May 1952	P. Rajavadan (additional charge).
Do.	7 May 1952	31 July 1952	K. P. Sanjoevi Shetty.
Senior Accounts Officer	(Throughout.)		P. Sreeramamurthi.
Assistant Accounts Officer (Internal Audit).	Do.		K. Viswanathan Nair.
Junior Accounts Officer (Internal Audit).	Do.		T. Krishna Shetty.
Special Deputy Director of Agriculture (Crop Sampling), Madras.	Do.		V. Satagopa.
Special district Agricultural Officer (Crop Sampling), Madras.	1 July 1951	30 May 1952	K. Santhanam.
Do.	31 May 1952	18 Aug. 1952	J. H. S. Ponnyya.
Assistant Agricultural Engineer (State Farming Scheme).	11 Aug. 1951	To date	Leo Swamikan.

DISTRICTS.

Marketing Section.

Assistant Marketing Officer, Kakinada.	(Throughout.)		V. Suryanarayana.
Assistant Marketing Officer, Cuddapah.	1 July 1951	18 Mar. 1952	P. K. Parameswara Monon.
Do.	19 Mar. 1952	17 June 1952	S. Rajaratnam Chetty.
Assistant Marketing Officer, Tiruchirappalli.	18 June 1952	To date	T. K. Thangavelu.
Assistant Marketing Officer, Coimbatore.	Do.		K. Narayanan Nair.
	Do.		C. Raman Moosad.

Agricultural College, Coimbatore.

Principal	(Throughout.)		P. D. Karunakar.
Vice-Principal	1 July 1951	29 Feb. 1952	G. Venkatanarayana. (Oil-seeds Specialist.)
Do.	1 Mar. 1952	2 Mar. 1952	Vacant.
Do.	3 Mar. 1952	30 June 1952	P. Krishna Rao. (Millet Specialist.)
Lecturer in Agriculture	1 July 1951	14 July 1951	A. H. S. Sarma (additional charge).
Do.	15 July 1951	14 Aug. 1951	M. Satyanarayana.
Do.	15 Aug. 1951	24 Sep. 1951	A. H. S. Sarma (additional charge).
Do.	25 Sep. 1951	21 Feb. 1952	P. A. Venkateswara Iyer.
Do.	22 Feb. 1952	To date	V. T. Subbiah Mudaliar.

DISTRICTS—cont.

Post.	Period.		Name of officer-in-charge.
	From	To	
Agricultural College, Coimbatore—cont.			
Gazetted Assistant Lecturer in Agriculture.	1 July 1951	26 Dec. 1951	A. H. S. Sarma.
Do.	27 Dec. 1951	10 Jan. 1952	P. A. Venkateswara Iyer (Additional charge).
Do.	11 Jan. 1952	To date	A. H. S. Sarma.
Lecturer in Animal Hygiene.	1 July 1951	31 Oct. 1951	Francis Joseph.
Do.	1 Nov. 1951	31 Dec. 1951	S. N. Vaidyanathan, Assistant in additional charge.
Do.	1 Jan. 1952	To date	Francis Joseph.
Lecturer in Agricultural Economics.	(Throughout).		S. V. Doraiswami Iyer.
Lecturer in Entomology	1 July 1951	15 Aug. 1951.	N. Raghava Rao.
Do.	16 Aug. 1951	27 Apr. 1952.	K. P. Ananthanarayanan.
Do.	28 Apr. 1952	30 May 1952.	S. Ramachandran (additional charge). Government Entomologist.
Do.	31 May 1952	11 June 1952.	V. Thirumala Rao (additional charge). Government Entomologist.
Do.	12 June 1952	To date	K. P. Ananthanarayanan.
Gazetted Assistant Lecturer in Entomology.	1 July 1951	27 Jan. 1952	A. R. Seshadri.
Do.	28 Jan. 1952	11 Feb. 1952.	S. Ramachandran, Government Entomologist (additional charge).
Do.	12 Feb. 1952	6 Aug. 1952	A. R. Seshadri.
Lecturer in Mycology	1 July 1951	31 Oct. 1951	T. S. Ramakrishnan, Government Mycologist (additional charge).
Do.	1 Nov. 1951	To date	M. Kandaswami.
Lecturer in Chemistry	(Throughout).		M. Sundaram.
Gazetted Assistant Lecturer in Chemistry.	1 July 1951	20 Aug. 1951	E. J. Verghese.
Do.	21 Aug. 1951	31 Aug. 1952	C. Raghavendrachar (additional charge.)
Do.	1 Sep. 1951	3 Sep. 1951	T. S. Lakshmanan (additional charge).
Do.	4 Sep. 1951	To date	V. V. K. Sastri.
Assistant Lecturer and Systematic Botanist.	(Throughout).		D. Daniel Sundararaj.
Assistant Agricultural Engineer (Civil).	1 July 1951	3 June 1952	B. K. Sadasiva Rao.
	4 June 1952	20 July 1952.	K. T. Guruswamy, Civil Supervisor (additional charge).
Assistant Agricultural Engineer (Mechanical).	1 July 1951	19 Dec. 1951.	J. P. Walter Devasahayam
Do.	20 Dec. 1951	27 Dec. 1952.	J. P. Walter Devasahayan (additional charge).
Do.	28 Dec. 1951	To date	P. K. Radhakanth.
Cytogeneticist, Coimbatore.	1 July 1951	2 May 1952	Dr. N. Krishnaswami.
Do.	3 May 1952	21 May 1952.	S. Sampath (additional charge).
Do.	1 June 1952	To date	Dr. N. Krishnaswami.
Cytogeneticist, Bapatla at Coimbatore.	1 July 1951	31 Mar. 1952.	S. Sampath.
Do.	1 Apr. 1952	20 Apr. 1952.	Dr. N. Krishnaswami (additional charge).
Do.	21 Apr. 1952	To date	S. Sampath.
Plant Physiologist	1 July 1951	29 Feb. 1952.	T. R. Narayanan.
Do.	1 Mar. 1952	31 Mar. 1952.	P. D. Karunakar, Principal (additional charge).

APPENDICES

Post.		Districts—cont.		Name of officer-in-charge.
		From	To	
Plant Physiologist Superintendent, Farm.	Central	1 Apr. 1952	To date (Throughout).	T. R. Narayanan. K. Ramaswami Iyer.
Principal		1 July 1951	23 Oct. 1951	P. Venkatramiah.
		24 Oct. 1951	4 Dec. 1951	M. Satyanarayana, Senior Lecturer in Agriculture (Additional charge).
Senior Lecturer in Agriculture.		5 Dec. 1951	To date	R. Balasubramaniam.
		1 July 1951	16 Sep. 1951	P. A. Venkateswara Iyer.
		17 Sep. 1951	11 June 1952	M. Satyanarayana.
		12 June 1952	19 June 1952	L. Krishnan, Junior Lecturer in Agriculture (Additional charge).
		20 June 1952	5 July 1952	D. Hanumantha Rao, Junior Lecturer in Agriculture (Additional charge).
Junior Lecturer in Agriculture.		1 July 1951	15 Oct. 1951	M. Narasimham.
		16 Oct. 1951	7 Dec. 1951	M. Satyanarayana (Additional charge).
		8 Dec. 1951	25 May 1952	D. Hanumantha Rao.
		26 May 1952	19 June 1952	L. Krishnan.
		20 June 1952	21 July 1952	D. Hanumantha Rao.
Lecturer in Chemistry			(Throughout.)	M. R. Balakrishna Iyer.
Gazetted Assistant Lecturer in Chemistry.			Do.	Dr. P. Satyanarayana.
Lecturer in Entomology			Do.	C. S. Balasubramaniam.
Gazetted Assistant Lecturer in Entomology.		1 July 1951	17 Dec. 1951	Kanakaraj David.
Lecturer in Botany		18 Dec. 1951	20 July 1952	N. Raghava Rao.
Gazetted Assistant Lecturer in Botany.			(Throughout.)	T. Venkataramana Reddi.
		1 July 1951	8 July 1951	T. Venkataramana Reddi (Additional charge).
Lecturer in Civil Engineering.		8 July 1951	To date	B. Appala Naidu.
Lecturer in Mechanical Engineering.			(Throughout.)	T. Radhakrishnan.
Plant Physiologist			Do.	R. Subramaniam.
		1 July 1951	23 Oct. 1951	P. Venkataramiah, Principal (Additional charge).
		24 Oct. 1951	4 Dec. 1951	M. Satyanarayana, Senior Lecturer in Agriculture (Additional charge).
		5 Dec. 1951	To date	R. Balasubramaniam, Principal (Additional charge).
Lecturer in Mycology		1 July 1951	19 Oct. 1951	K. V. Srinivasan.
Lecturer in Agricultural Economics.		20 Oct. 1951	To date	G. V. Govindaswami.
Superintendent, College Farm.			(Throughout.)	Dr. M. Srinivasan.
			Do.	C. Hanumantha Rao.
RESEARCH SECTIONS.				
Paddy Section.				
Paddy Specialist		1 July 1951	To date	B. Venkatanarasimha Rao.
Assistant Paddy Specialist, Coimbatore.			(Throughout.)	V. Krishnaswami.
		21 July 1951	To date	A. Abdul Samad.

APPENDICES

RESEARCH SECTIONS—cont.

Post.	Period.		Name of officer-in-charge.
	From	To	
Paddy Section—cont.			
Assistant Paddy Specialist, Pattambi.	1 July 1951 ..	17 July 1951 ..	A. Abdul Samad.
Agricultural Meteorologist, Coimbatore.	18 July 1951 ..	To date (Throughout.)	P. Uttaman. C. Balasubramaniam.
Cotton Section.			
Cotton Specialist, Coimbatore.	1 July 1951 ..	13 Apr. 1952 ..	C. Jagannatha Rao.
Assistant Cotton Specialist, Coimbatore.	14 Apr. 1952 ..	To date (Throughout.)	S. M. Kalyanaraman. T. V. Rangaswamy.
Assistant Cotton Specialist, Tiruppur.		Do.	N. G. Narayanan.
Assistant Cotton Specialist, Srivilliputtur.	1 July 1951 ..	15 Aug. 1951 ..	P. N. Krishnaswami Rao.
Assistant Cotton Specialist, Karunganni Scheme, Koilpatti.	16 Aug. 1951 ..	To date	C. K. Ramachandran.
	1 July 1951 ..	12 Apr. 1952 ..	S. M. Kalyanaraman.
	13 Apr. 1952 ..	27 July 1952 ..	S. Mayandi Pillai, Assistant Cotton Specialist, K-2 and Co. 4 Scheme (additional charge).
Assistant Cotton Specialist, K-2 and Co. 4 Scheme, Koilpatti.		(Throughout.)	S. Mayandi Pillai.
Assistant Cotton Specialist, Siruguppa.	1 July 1951 ..	16 June 1952 ..	A. Raghavan.
	17 June 1952 ..	1 Aug. 1952 ..	K. Satyanarayamurthi, Assistant Cotton Specialist, Hagari (additional charge).
Assistant Cotton Specialist, Hagari.		(Throughout.)	K. Satyanarayansmurthi.
Assistant Cotton Specialist, Winter Cambodia Scheme, Coimbatore.		Do.	V. Ramaswamy Mudaliar.
Assistant Cotton Specialist, Narasaraopeta.		Do.	G. Seshadri Ayyangar.
Cotton Certification Officer, Rajapalayam.	16 Aug. 1951 ..	To date	P. M. Krishnaswami Rao.
Assistant Cotton Specialist, Nandyal.		(Throughout.)	M. Venkoba Rao.
Assistant Cotton Specialist, Guntur.	1 July 1951 ..	20 July 1952 ..	L. Neelakantan.
Cotton Extension Officer, Coimbatore.	1 July 1951 ..	20 Nov. 1951 ..	R. Balasubramaniam.
	1 Dec. 1951 ..	19 Dec. 1951 ..	N. Kesava Iyengar, Assistant Cotton Extension Officer (additional charge).
	20 Dec. 1951 ..	13 Apr. 1952 ..	C. Jagannatha Rao, Cotton Specialist (Additional charge).
Assistant Cotton Extension Officer, Coimbatore.	14 Apr. 1952 ..	To date	C. Jagannatha Rao.
	1 July 1951 ..	4 Apr. 1952 ..	N. Kesava Iyengar.
	5 Apr. 1952 ..	18 Apr. 1952 ..	C. Jagannatha Rao, Cotton Specialist (additional charge).
Assistant Cotton Extension Officer, Koilpatti.	19 Apr. 1952 ..	To date	N. Kesava Iyengar.
	1 July 1951 ..	14 Aug. 1951 ..	C. K. Ramachandran.
	15 Aug. 1951 ..	23 Sep. 1951 ..	S. Mayandi Pillai, Assistant Cotton Specialist (Additional charge).
	24 Sep. 1951 ..	To date	R. Krishnamurthi.

Post.	RESEARCH SECTIONS—cont.		Name of officer in-charge.
	Period.		
	From	To	
Cotton Section—cont.			
Assistant Cotton Extension Officer, Ballary.	1 July 1951	13 Sep. 1951	R. Krishnamurthi.
Assistant Cotton Extension Officer, Guntur.	14 Sep. 1951	To date	M. Subramania Chetty.
	16 June 1952	To date	K. Kannian.
Millet Section.			
Millet Specialist, Coimbatore.	1 July 1951	To date	P. Krishna Rao.
Assistant Millet Specialist, Coimbatore.	1 July 1951	30 Nov. 1951	A. Kunhikoran Nambiyar.
	1 Dec. 1951	7 Dec. 1951	P. Krishna Rao, Millet Specialist (additional charge).
Do.	8 Dec. 1951	31 Mar. 1952	B. L. Narasimhamurthi.
	1 Apr. 1952	To date	A. Kunhikoran Nambiar.
	1 July 1951	21 July 1951	U. Achutha Warriar.
Assistant Millet Specialist, Nandyal.	22 July 1951	To date	V. Krishnaswami.
	(Throughout.)		P. Subramanyam.
Oil-seeds Section.			
Oilseeds Specialist, Coimbatore.	1 July 1951	29 Feb. 1952	G. Venkatanarayana.
Assistant Oilseeds Specialist, Coimbatore.	1 Mar. 1952	30 June 1952	C. R. Seshadri.
	1 July 1951	29 Feb. 1952	S. G. Ayyadurai.
	1 Mar. 1952	30 Apr. 1952	C. R. Seshadri, Oil-seeds Specialist (additional charge).
Superintendent, Agricultural Research Station, Tindivanam.	1 May 1952	To date	S. D. S. Albuquerque.
	(Throughout.)		M. Bhavanishankar Rao.
Superintendent, Agricultural Research Station, Nilshwar.	1 July 1951	14 Nov. 1951	K. V. Govindan Nair, Farm Manager (Additional charge).
	15 Nov. 1951	5 June 1952	P. M. Sayeed, Assistant in additional charge.
Assistant Oil-seeds Specialist, Nucleus Seed Farm, Coimbatore.	6 June 1952	To date	P. M. Sayeed.
	10 Jan. 1952	29 Feb. 1952	C. R. Seshadri.
Cardamom Specialist	1 Mar. 1952	To date	S. G. Ayyadurai.
Pepper Specialist	(Throughout.)		V. Gomathinayagam Pillai.
	Do		Dr. P. Abraham.
Pulses Section.			
Pulses Specialist	(Throughout.)		M. A. Sankara Iyer.
Fruit Section.			
Fruit Specialist, Coimbatore.	(Throughout.)		U. Narasinga Rao.
Assistant Fruit Specialist, Coimbatore.	1 July 1951	5 Dec. 1951	K. Fazulla Khan.
Assistant Fruit Specialist, Orchardcum-Nurseries, Coimbatore.	6 Dec. 1951	To date	K. Sambamurthi.
	17 Dec. 1951	To date	V. S. Rangaswari.
Assistant Fruit Specialist, Coonoor.	1 July 1951	12 Dec. 1951	Do.
Banana Research Officer, Aduthurai.	13 Dec. 1951	To date	K. Fazulla Khan.
	1 July 1951	12 Dec. 1951	T. Gopalan Nair.
	11 Sep. 1951	17 Sep. 1951	C. R. Muthukrishnan, Assistant in Additional charge.
	18 Sep. 1951	25 Oct. 1951	T. Gopalan Nair.

Post.	Period.		Name of officer in charge.
	From	To	
RESEARCH SECTIONS—cont.			
Fruit Section—cont.			
	26 Oct. 1951 ..	15 Nov. 1951 ..	C. R. Muthukrishnan, Assistant in Additional charge.
	16 Nov. 1951 ..	7 May 1952 ..	T. Gopalan Nair.
	8 May 1952 ..	7 June 1952 ..	K. Ramaswamy, Superintendent, Agricultural Research Station, Aduthurai, in Additional charge.
	8 June 1952 ..	to date ..	T. Gopalan Nair.
Fruit Products Section.			
Bio-Chemist, Kodur ..	1 July 1951 ..	22 July 1951 ..	C. Bhujanga Rao, Superintendent, Fruit Research Station, Kodur, Additional charge.
	23 July 1951 ..	30 May 1952 ..	Dr. R. Ramamurthy Reddi.
	31 May 1952 ..	13 Aug. 1952 ..	C. Bhujanga Rao, Additional charge.
Botany Section.			
Government Lecturing and Systematic Botanist.	(Throughout.)		C. Rajasekara Mudaliar.
Assistant Lecturing and Systematic Botanist.	Do.		D. Daniel Sundaraj.
Systematic Botanist, Aduthurai.	1 July 1951 ..	10 Sep. 1951 ..	T. Gopalan Nair, Banana Research Officer, Additional charge.
	11 Sep. 1951 ..	17 Sep. 1951 ..	C. R. Muthukrishnan, Assistant in Additional charge.
	18 Sep. 1951 ..	25 Oct. 1951 ..	T. R. Gopalan Nair, Additional charge.
	26 Oct. 1951 ..	15 Nov. 1951 ..	C. R. Muthukrishnan, Additional charge.
	16 Nov. 1951 ..	7 June 1952 ..	T. Gopalan Nair, Additional charge.
	8 May 1952 ..	7 June 1952 ..	K. Ramaswamy, Superintendent, Agricultural Research Station, Aduthurai, in Additional charge.
	8 June 1952 ..	to date ..	T. Gopalan Nair, Additional charge.
Sugarcane Section.			
Sugarcane Specialist, Anakapalle.	1 July 1951 ..	29 May 1952 ..	S. V. Parthasarathy, Assistant Physiologist, (in Additional charge) Anakapalle.
	30 May 1952 ..	to date ..	S. V. Parthasarathy.
Assistant Agronomist Sugarcane Research Station Anakapalle.	1 July 1951 ..	3 Dec. 1951 ..	P. Seetharamaiah.
	4 Dec. 1951 ..	15 Dec. 1951 ..	V. K. Appaji, Superintendent, Sugarcane Research Station in Additional charge.
	16 Dec. 1951 ..	to date ..	M. Lakshmikantham.
Assistant Mycologist ..	(Throughout.)		C. S. Krishnamurthy.
Assistant Physiologist ..	1 July 1951 ..	29 May 1952 ..	S. V. Parthasarathy.
	30 May 1952 ..	to date ..	S. V. Parthasarathy, Sugarcane Specialist, Additional charge.
Assistant Chemist	(Throughout.)		N. Veera Mohan Rao.
Assistant Entomologist. ..	Do.		Muhammad Basheer.

APPENDICES

Post.	Period.		Name of officer in charge.
	From	To	
RESEARCH SECTIONS—cont.			
Sugarcane Section—cont			
Superintendent, Sugarcane Research Station, Anakapalle.	1 July 1951 ..	5 Mar. 1952 ..	V. K. Appaji.
	6 Mar. 1952 ..	11 Mar. 1952 ..	M. Lakshmikantham, Assistant, Agronomist, Additional charge.
	12 Mar. 1952 ..	8 Aug. 1952 ..	C. S. Krishnamurthy, Assistant Mycologist, Additional charge.
Superintendents, Sugarcane, Liaison Farms.			
Hospet	(Throughout.)		C. Ekambaram.
Samalkot	1 July 1951 ..	8 Dec. 1951 ..	M. Lakshmikantham.
	9 Dec. 1951 ..	to date ..	P. Seetharamiah.
Nellikuppam	1 July 1951 ..	6 Feb. 1952 ..	C. S. Krishnaswamy Iyer.
	7 Feb. 1952 ..	31 Mar. 1952 ..	K. R. Sundaresan, Farm Manager, (Additional charge).
	1 Apr. 1952 ..	23 June 1952 ..	M. J. David, Sugarcane Inspector, Nellikuppam, (Additional charge).
	24 June 1952 ..	to date ..	K. R. Sundaresan in Additional charge.
Kulittalai	(Throughout)		S. Ramaswami.
Chemistry Section.			
Government Agricultural Chemist.	(Throughout)		M. Sanyasi Raju.
Agricultural Bacteriologist..	Do.		T. Rajagopala Iyengar.
Soil Physicist	Do.		F. L. Daniel.
Assistant Agricultural Chemist, Coimbatore.	1 July 1951 ..	6 Mar. 1952 ..	T. S. Lakshmanan.
Do.	7 Mar. 1952 ..	to date ..	D. V. Krishna Rao.
	1 July 1951 ..	31 Aug. 1951 ..	C. Raghavendrahar.
	1 Sep. 1951 ..	27 Nov. 1951 ..	T. S. Lakshman (additional charge).
	28 Nov. 1951 ..	6 July 1952 ..	W. Thirumala Rao.
Assistant Agricultural Chemist (Malt Factory).	(Throughout)		K. M. Krishna Menon.
Entomology Section.			
Government Entomologist, Coimbatore.	1 July 1951 ..	30 May 1952 ..	S. Ramachandran.
Assistant Entomologist, Coimbatore.	31 May 1952 ..	4 July 1952 ..	V. Thirumala Rao.
	1 July 1951 ..	25 Dec. 1951 ..	M. S. Subbiah.
	26 Dec. 1951 ..	26 Dec. 1951 ..	S. Ramachandran, (Government Entomologist in additional charge).
	27 Dec. 1951 ..	5 Aug. 1952 ..	S. Kanakaraj David.
Assistant Entomologist, Fernhill.	(Throughout)		P. S. Narayanaswamy.
Do.	26 Dec. 1951 ..	15 Jan. 1952 ..	S. Ramachandran (Government Entomologist in additional charge).
	16 Jan. 1952 ..	to date ..	M. S. Subbiah.
Mycology Section.			
Government Mycologist, Coimbatore.	1 July 1951 ..	14 July 1951 ..	D. Marudarajan.
Assistant Mycologist ..	15 July 1951 ..	to date ..	T. S. Ramakrishnan.
	(Throughout)		C. S. Krishnaswamy.
Assistant Mycologist, Ootacamund.	1 July 1951 ..	26 Oct. 1951 ..	M. Kandaswamy.
	26 Oct. 1951 ..	to date ..	K. V. Srinivasan.

APPENDICES

Post.	Period.		Name of officer in charge.
	From	To	
RESEARCH SECTION—cont.			
Agricultural Research Engineering Section.			
Assistant Agricultural Engineer (Research), Coimbatore.	1 July 1951 .. 21 Aug. 1951 ..	20 Aug. 1951 .. 19 Dec. 1951 ..	C. P. Raju. R. G. Menon (Gazetted Assistant in additional charge).
Gazetted Assistant to Assistant Agricultural Engineer, (Research).	1 July 1951 .. 1 June 1952 ..	31 May 1952 .. 30 June 1952 ..	R. G. Menon. J. P. Walter Devasahayam, Assistant Agricultural Engineer (Research) Additional charge.
Crop and Plant Protection Officers.			
Chief and Plant Protection Officer (Entomology), Bapatla.	1 July 1951 .. 22 Jan. 1952 ..	21 Jan. 1952 .. 27 Jan. 1952 ..	V. Tirumala Rao. P. Govinda Rao, Crop and Plant Protection Officer (Mycology), additional charge).
	28 Jan. 1952 ..	12 July 1952 ..	K. R. Nagarajan.
Chief and plant Protection Officer (Entomology) Coimbatore.	1 July 1951 .. 16 Aug. 1951 ..	15 Aug. 1951 .. to date ..	K. P. Ananthanarayanan. E. R. Gopala Menon.
Chief and Plant Protection Officer (Mycology), Bapatla.	(Throughout)		P. Govinda Rao.
Chief and Plant Protection Officer (Mycology), Coimbatore.	1 July 1951 ..	24 July 1952 ..	K. Krishna Menon.
DISTRICTS.			
Visakhapatnam Division.			
Deputy Director of Agriculture, Visakhapatnam.	(Throughout)		K. Venkataraman.
District Agricultural Officer, Srikakulam.	Do.		Baghirathi Paddy.
District Agricultural Officer, Anakapalle.	Do.		M. Ramamurthi.
Deputy District Agricultural Officer, Araku.	Do.		K. Bhushanam.
Assistant Agricultural Engineer, Anakapalle.	20 July 1951 ..	to date ..	Y. Hanumantha Rao.
Sugarcane Inspector, Visakhapatnam.	10 Dec. 1951 .. 17 May 1952 ..	16 May 1952 .. 31 May 1952 ..	N. V. Kalyanasundaram. M. Ramamurthi, District Agricultural Officer, Anakapalle (additional charge).
Eluru Division.			
Deputy Director of Agriculture, Eluru.	1 July 1951 .. 7 July 1951 .. 14 June 1952 ..	6 July 1951 .. 13 June 1952 .. to date ..	S. S. Katchapeswaran. T. Rangabrahma Rao. M. Satyanarayana.
District Agricultural Officer, Eluru.	(Throughout)		B. Santhanakrishnan.
District Agricultural Officer, Kakinada.	Do.		K. Veerabadra Rao.
Superintendent, Agricultural Research Station, Samalkot.	1 July 1951 .. 24 Aug. 1951 .. 30 Aug. 1951 ..	23 Aug. 1951 .. 29 Aug. 1951 .. 30 Sep. 1951 ..	M. Rayappa Pillai. M. P. Narasimha Rao. A. Subba Raju, Senior Farm Manager, additional charge.
	1 Oct. 1951 ..	to date ..	Syed Ibrahim.
Superintendent, Agricultural Research Station, Maruturu.	1 July 1951 .. 15 Aug. 1951 ..	14 Aug. 1951 .. to date ..	N. P. Narasimha Rao. N. H. V. Krishnamurthy.
District Agricultural Officer, Vijayavada.	(Throughout)		M. Satyanarayanamurthy.

APPENDICES

Post.	Period.		Name of officer in charge.
	From	To	
DISTRICTS—cont.			
Eluru Division—cont			
Seed Development Officer (Paddy), Kakinada.	(Throughout)	..	K. B. Viswanadhan.
Additional District Agricultural Officer (Manuring Scheme), Kakinada.	1 July 1951 .. 15 Sep. 1951 .. 17 Sep. 1951 .. 30 Nov. 1951 .. Post abolished from 1 Dec. 1951, 18 June 1951 .. to date	..	S. Rajaratnam Chettiar. K. Krishnan.
Additional District Agricultural Officer (Manuring Scheme), Eluru.	1 July 1951 .. 30 Nov. 1951 .. Post abolished from 1 Dec. 1951, 18 June 1952 .. 28 July 1952 ..	..	G. Ranganadhaswamy. N. Srinivasa Rao.
Sugarcane Inspector, Samalkot.	11 Dec. 1951 .. 31 May 1952 ..	..	P. Somayajulu. T. N. Balasubramaniam.
Sugarcane Inspector, Vuyyure.	14 Dec. 1951 .. 22 May 1952 ..	..	J. H. S. Ponnayya.
Additional District Agricultural Officer (Manuring Scheme), Vijayavada.	1 July 1951 .. 30 Nov. 1951 .. Post abolished from 1 Dec. 1951, 28 June 1952 .. to date	..	D. Hanumantha Rao. K. C. Thomas.
Special District Agricultural Officer (Crop Sampling), Vijayavada.	1 July 1951 .. 24 July 1951 ..	..	K. Veerabhadra Rao, District Agricultural Officer, Kakinada additional charge.
	25 July 1951 .. 3 May 1952 .. 4 May 1952 .. 8 June 1952 ..	..	V. Rama Rao. K. Veerabhadra Rao, District Agricultural Officer, Kakinada, additional charge.
Special District Agricultural Officer (Crop sampling), Vijayavada.	9 June 1952 .. to date .. 1 July 1951 .. 1 June 1952 .. 2 June 1952 .. 12 June 1952 .. 13 June 1952 .. 7 July 1952 ..	..	M. Somayya. M. Somayya. D. Hanumantha Rao. M. Satyanarayanamurthy, District Agricultural Officer, Vijayavada (additional charge).
Assistant Agricultural Engineer (Inspection), Vijayavada.	1 July 1951 .. 17 Oct 1951 .. 18 Oct. 1951 .. to date	..	P. Rajavadhan. C. Kamalarathnam.
Guntur Division.			
Deputy Director of Agriculture, Guntur.	1 July 1951 .. 15 June 1952 .. 16 June 1952 .. 17 June 1952 ..	..	Mohammed Khasim Adeni. Mohamad Obaidullah Shah, Deputy Director of Agriculture, Cuddapah, (additional charge).
District Agricultural Officer, Guntur.	18 June 1952 .. to date .. (Throughout)	..	T. Rangabrahma Rao. P. L. Narasimham.
District Agricultural Officer, Nellore.	(Throughout)	..	G. V. Ratnam.
District Agricultural Officer, Kurnool.	1 July 1951 .. 16 Apr. 1952 .. 17 Apr. 1952 .. to date	..	T. Krishna Reddi. - M. Jeevan Rao.
Additional District Agricultural Officer, (Manuring Scheme) Guntur.	1 July 1951 .. 30 Nov. 1951 .. Post abolished from 1 Dec. 1951, 23 June 1952 .. to date	..	S. V. Ramachandran. M. Vaidyanathan.
Additional District Agricultural Officer (Manuring Scheme) Nellore.	1 July 1951 .. 30 Nov. 1951 .. Post abolished from 1 Dec. 1951, 30 June 1952 .. to date	..	A. K. Annaswami Iyer. M. J. David.
Assistant Agricultural Engineer (Tractor workshop), Bapatla.	1 July 1951 .. 10 Aug. 1951 .. 11 Aug. 1951 .. 18 Sep. 1951 ..	..	C. S. Seetharamayya. R. S. Subramaniam, Lecturer in Mechanical Engineering Agricultural College, Bapatla (additional charge).
	19 Jan. 1951 .. to date	..	C. Seetharamayya.

APPENDICES

Post.	Period.		Name of officer in charge.
	From	To	
DISTRICTS—cont.			
Cuddapah Division.			
Deputy Director of Agriculture, Cuddapah.	(Throughout)		Md. Obeidullah Shah.
District Agricultural Officer, Cuddapah.	1 July 1951 .. 29 Feb. 1952 ..		M. Jeevan Rao.
District Agricultural Officer, Chittoor.	1 Mar. 1952 .. 1 July 1952 ..		A. K. Annaswami Iyer.
District Agricultural Officer, Anantapur.	1 July 1951 .. 16 July 1951 ..		V. Rama Rao.
District Agricultural Officer, Bellary.	17 July 1951 .. to date ..		E. G. Sivaswami.
Special District Agricultural Officer, Tungabhadra Project, Bellary.	(Throughout)		A. B. Adisesha Reddi.
Seed Development Officer (Millets), Bellary.	Do.		K. Subba Rao.
Special District Agricultural Officer (Crop Sampling), Bellary.	Do.		K. Rama Rao.
Superintendent, Agricultural Research Station, Hagari.	1 July 1951 .. 25 Sep. 1951 ..		Syed Ibrahim.
Assistant Agricultural Engineer (Contour Bunding), Bellary.	26 Sep. 1951 .. to date ..		G. Ramabhadran.
	(Throughout)		Mirza Anser Baig.
	Do.		S. Ramachandra Rao.
	1 July 1951 .. 2 July 1951 ..		N. Sankaranarayana Reddi.
	3 July 1951 .. 14 July 1951 ..		G. Sankara Reddi, Assistant (additional charge).
	15 July 1951 .. 18 May 1952 ..		N. Sankaranarayana Reddi.
	19 May 1952 .. 7 June 1952 ..		D. Raghunatha Reddi, Assistant (additional charge).
	8 June 1952 .. to date ..		N. Sankaranarayana Reddi.
	(Throughout)		T. S. Palanivelu.
	10 Sep. 1951 .. 18 Nov. 1951 ..		C. Raghavendrachar.
	19 Nov. 1951 .. 28 Dec. 1951 ..		Vacant.
	29 Dec. 1951 .. 9 May 1952 ..		C. Raghavendrachar.
	N.B.—Headquarters shifted to Coimbatore from 10 May 1952.		
Agronomist, Siruguppa	1 July 1951 .. 9 Mar. 1952 ..		R. Anantapadmanabha Pillai.
	20 Mar. 1952 .. 9 Apr. 1952 ..		M. Jeevan Rao.
	10 Apr. 1952 .. 24 June 1952 ..		S. V. Ramachandran.
	25 June 1952 .. to date ..		S. Rajaratnam Chettiar.
	(Throughout)		C. Bhujanga Rao.
Vellore Division.			
Deputy Director of Agriculture, Vellore.	(Throughout)		G. Sakharana Rao.
District Agricultural Officer, Vellore.	Do.		R. Alagiamanavalan.
District Agricultural Officer, Guindy.	Do.		K. L. Ramakrishna Rao.
District Agricultural Officer, Salem.	Do.		S. M. Sulaiman.
Superintendent, Agricultural Research Station, Tiruruppam.	Do.		M. K. Venkatasubramaniam.
Seed Development Officer (Paddy), Vellore.	Do.		N. C. Thirumalacharya.
Assistant Agricultural Engineer (Inspection), Vellore.	Do.		A. K. Subramaniam.

Post.	Period.		Name of officer in charge.
	From	To	
DISTRICTS—cont.			
Tanjore Division.			
Deputy Director of Agriculture, Tanjore.	(Throughout)		K. Varadachari.
District Agricultural Officer, Tanjore.	1 July 1951	9 Mar. 1952	K. S. Krishnamurthi.
District Agricultural Officer, Pattukkottai.	10 Mar. 1952	to date	K. Krishnan.
District Agricultural Officer, Cuddalore.	(Throughout)		U. B. Mohammed Abbas.
District Agricultural Officer, Sugarcane Inspector, Nellikuppam.	Do.		A. Ramadoss.
Sugarcane Inspector, Pugalur	7 Dec. 1951	18 Mar. 1952	M. Mukundan.
	19 Mar. 1952	23 June 1952	M. J. David.
District Agricultural Officer, Tiruchirappalli.	8 Dec. 1951	31 May 1952	K. H. Subramania Iyer.
	1 July 1951	2 Feb. 1952	T. S. Francis.
	3 Feb. 1952	29 Feb. 1952	P. S. Athmarama Iyer, Personal Assistant, (additional charge).
Additional Agricultural Officer (Manuring Scheme), Tanjore.	1 Mar. 1952	to date	T. S. Francis.
	1 July 1951	29 Aug. 1951	K. Krishnan.
	30 Aug. 1951	5 Nov. 1951	P. S. Venkatasubramaniam.
	6 Nov. 1951	30 Nov. 1951	S. Muthuswami Iyer.
	Post abolished from 1 Dec. 1951.		
	23 June 1952	9 July 1952	K. Raghunatha Reddi.
Additional District Agricultural Officer (Manuring Scheme), Tiruchirappalli.	1 July 1951	30 Nov. 1951	K. H. Subramania Iyer.
Additional District Agricultural Officer (Manuring Scheme), Pattukkottai.	Post abolished from 1 Dec. 1951.		
	9 June 1952	to date	K. H. Subramania Iyer.
	1 July 1951	12 July 1951	M. J. David.
	13 July 1951	30 Nov. 1951	M. Mukundan.
	Post abolished from 1 Dec. 1951.		
	25 June 1952	to date	Krishnan.
Special District Agricultural Officer (Crop sampling), Tanjore.	1 July 1951	23 Oct. 1951	K. Srinivasacharya.
	24 Oct. 1951	5 Nov. 1951	P. S. Venkatasubramaniam, Additional District Agricultural Officer, Tanjore, Additional Charge.
	6 Nov. 1951	to date	P. S. Venkatasubramaniam.
Superintendent, Agricultural Research Station, Palug.	1 July 1951	31 Aug. 1951	R. Vaidyanathan, Farm Manager, Additional Charge.
	1 Sep. 1951	to date	M. Rayappa Pillai.
Superintendent, Agricultural Research Station, Aduthurai.	(Throughout)		K. Ramaswamy.
Seed Development Officer, (Paddy), Tanjore.	Do.		R. Govindaramiah.
Assistant Agricultural Engineer (Inspection), Tiruchirappalli.	1 July 1951	17 July 1951	P. K. Radhakanth.
	18 Oct. 1951	to date	C. R. Subramaniam.
Madurai Division.			
Deputy Director of Agriculture, Madurai.	(Throughout)		A. Mohammed Ali.
District Agricultural Officer, Madurai.	Do.		N. Krishna Pillai.
District Agricultural Officer, Sattur.	1 July 1951	31 July 1951	N. S. Rajagopalan.
	1 Aug. 1951	14 Aug. 1951	V. K. Sankarasubramaniam, Personal Assistant, Additional Charge.
	15th Aug. 1951	to date	N. S. Rajagopalan.
District Agricultural Officer, Tirunelveli.	16 June 1952	to date	A. K. Ramasubba Iyer.
	(Throughout)		

Post.	Period		Name of officer in charge.
	From	To	
DISTRICTS—cont.			
Madurai Division—cont.			
Superintendent, Agricultural Research Station, Koilpatti.	(Throughout)		B. W. X. Ponniah.
Additional District Agricultural Officer, Manuring Scheme, Madurai.	1 July 1951 .. 30 Nov. 1951 ..	T. N. Balasubramaniam.	
Special District Agricultural Officer, Crop sampling, Madurai.	Post abolished from 1 Dec. 1951.		
Sugarcane Inspector, Madurai.	11 June 1952. to date ..	T. N. Balasubramaniam. K. V. Natesa Iyer.	
Assistant Agricultural Engineer (Inspection), Mathurai.	(Throughout)		
Additional District Agricultural Officer (Manuring Scheme), Tiruchirappalli.	1 July 1951 .. 31 Oct. 1951 ..	S. Muthuswamy Iyer.	
Additional District Agricultural Officer (Manuring Scheme), Tiruchirappalli.	1 Nov. 1951 .. Scheme over ..		
Deputy Director of Agriculture, Coimbatore.	7 Dec. 1951 .. to date ..	S. Muthuswamy Iyer. C. S. Sreedharan.	
District Agricultural Officer, Coimbatore.	(Throughout)		
District Agricultural Officer, Tellicherry.	1 July 1951 .. 30 Nov. 1951 ..	K. H. Subramania Iyer.	
District Agricultural Officer, Shoranur.	Post abolished from 1 Dec. 1951.		
District Agricultural Officer, Mangalore.	9 June 1952 .. to date	K. H. Subramania Iyer.	
District Agricultural Officer, Ootacamund.	1 July 1951 .. 30 Nov. 1951 ..	N. V. Kalyanasundaram.	
Curator, Ootacamund	Post abolished from 1 Dec. 1951.		
Special District Agricultural Officer, (Crop sampling), Coimbatore.	2 July 1952 .. to date ..	S. V. Ramachandram.	
Special District Agricultural Officer, (Crop sampling), Shoranur.	Coimbatore Division.		
Superintendent, Agricultural Research Station, Nanjanad.	1 July 1951 .. 14 July 1951 ..	M. Satyanarayana.	
Superintendent, Colonization Scheme, Wynad.	15 July 1951. 4 Feb. 1952 ..	S. S. Katchapeswaran.	
Superintendent, Paddy Breeding Station, Mangalore.	5 Feb. 1952 .. 22 Feb. 1952 ..	T. S. Francis.	
Seed Development Officer, (Millets), Coimbatore.	23 Feb. 1952. up to date ..	P. A. Venkateswaraiyar.	
	1 July 1951 .. 25 Apr. 1952 ..	K. Sivasankara Menon.	
	26 Apr. 1952 to date ..	M. Mukundan.	
	(Throughout)		K. Sanjiva Shetty.
	1 July 1951 .. 1 Dec. 1951 ..	M. Gopala Unnithan.	
	2 Dec. 1951 .. 9 Dec. 1951 ..	N. K. Thomas, Personal Assistant, Additional Charge.	
	10 Dec. 1951. 14 Aug. 1952 ..	N. Srinivasa Rao.	
	(Throughout)		K. S. Ramana Rai.
	Do.		P. N. Nayar.
	1 July 1951 .. 25 July 1951 ..	Dr. S. Krishnamurthi.	
	26 July 1951. 26 July 1952 ..	P. N. Nayar, District Agricultural Officer, Ootacamund, Additional Charge.	
	1 July 1951 .. 31 Dec. 1951 ..	K. Raman Menon.	
	1 Jan. 1952 .. 31 Mar. 1952 ..	S. V. Ramachandran.	
	1 Apr. 1952 .. 15 Aug. 1952 ..	K. Raman Menon.	
	(Throughout)		P. P. Syed Mohamed.
	1 July 1951 .. 9 July 1951 ..	P. Uttaman.	
	10 July 1951. 20 Aug. 1951 ..	M. D. Azariah, Farm Manager, Additional Charge.	
	21 Aug. 1951. to date ..	K. Satharishi.	
	1 July 1951 .. 15 July 1951 ..	P. Govindakutty Kurup.	
	16 July 1951. 15 Sep. 1951 ..	K. Sambamurthy.	
	16 Sep. 1951 .. to date ..	P. Govinda Kutty Kurup.	
	(Throughout)		K. Hanumantha Rao.
	1 July 1951 .. 21 July 1951 ..	B. L. Narasimhamurthy.	
	22 July 1951. to date ..	U. Achutha Warier.	

APPENDICES

Post.	Period		Name of officer in charge.
	From	To	
RESEARCH SECTION—cont.			
Coimbatore Division—cont.			
Assistant Agricultural Engineer, Soil Conservation, Ootacamund.	17 July 1951.	to date	S. Narayanaswamy.
Assistant Agricultural Engineer (Tract workshop), Coimbatore.	1 July 1951 ..	11 Aug. 1951 ..	M. Umapathy.
	12 Aug. 1951.	20 Sep. 1951 ..	J. P. Walter Devashayam
	21 Sep. 1951 ..	to date	Assistant Agricultural Engineer (Mechanical) Additional Charge. M. Umapathy.

OFFICERS WHO WERE ON LEAVE.

Name and designation.	Period		Remarks.
	From	To	
K. P. Ananthanarayanan, Lecturer in Entomology, Coimbatore.	28 Apr. 1952 ..	11 June 1952 ..	.....
R. Ananthapadmanabha Pillai, Agronomist, Siruguppa.	10 Mar. 1952 ..	.....	Leave granted up to 9 Nov. 1952.
S. E. Anantharaman, Assistant Agricultural Engineer, (Headquarters).	8 Nov. 1951 ..	20 Dec. 1951 ..	.....
V. K. Appaji, Superintendent, Agricultural Research Station, Anakapalle.	6 Mar. 1952 ..	.....	Leave granted up to 5 Oct. 1952.
B. Appala Naidu, Gazetted Assistant Lecturer in Botany, Bapatla.	20 June 1951 ..	8 July 1951 ..	.....
A. Chidambaram Pillai, Deputy Director of Agriculture.	13 Nov. 1949..	12 Mar. 1952 ..	Leave preparatory to retirement.
Francis Joseph, Lecturer in Animal Hygiene, Coimbatore.	1 Nov. 1951 ..	31 Dec. 1951 ..	.....
E. R. Gopala Menon, Gazetted Assistant, Lecturer in Entomology, Coimbatore.	16 May 1951 ..	15 Aug. 1951 ..	.....
T. Gopalan Nair, Banana Research Officer, Aduthurai.	11 Sep. 1951 .. 11 Oct. 1951 .. 28 Oct. 1951 ..	17 Sep. 1951 .. 13 Oct. 1951 .. 15 Nov. 1951 ..	.....
M. Gopalan Unnithan, District Agricultural Officer, Kozhikode.	8 May 1952 .. 21 Feb. 1952 ..	7 June 1952 .. 20 June 1952 ..	Leave preparatory to retirement.
R. Govinda Menon, Gazetted Assistant to Assistant Agricultural Engineer (Research), Coimbatore.	1 June 1952 ..	30 June 1952 ..	.....
P. Govindakutty Kurup, Superintendent, Wynad Colonization Scheme.	16 July 1951 ..	15 Sep. 1951 ..	.....
N. Kesava Iyer, Assistant Cotton Extension Officer, Coimbatore.	5 Apr. 1952 ..	18 Apr. 1952 ..	.....
P. S. Krishnamurthy, Assistant Entomologist, Civil Supplies, Madras.	10 Jan. 1952 ..	27 Jan. 1952 ..	.....

APPENDICES

Name and designation.	Period		Remarks.
	From	To	
T. Krishna Reddy, District Agricultural Officer, Kurnool.	17 Apr. 1952 ..	1 July 1952 ..	.....
A. Kunhikoran Nambiar, Assistant Millet Specialist, Coimbatore.	1 Dec. 1951 ..	31 Mar. 1952 ..	.....
Dr. N. Krishnaswami, Cytogeneticist, Coimbatore.	3 May 1952 ..	31 May 1952 ..	.....
I. Kurma Rao, District Agricultural Officer, on foreign service, under K.C.P., Ltd., Vuyyur.	5 July 1951 ..	31 Aug. 1951 ..	.....
K. S. Krishnamurthi, District Agricultural Officer, Tanjore.	10 Mar. 1952 ..	9 July 1952 ..	.....
Md. Khasim Adeni, Deputy Director of Agriculture, Guntur.	16 June 1952 ..	28 June 1952 ..	.....
M. Mukundan, Sugarcane Inspector, Nellikuppam.	19 Mar. 1952 ..	17 Apr. 1952 ..	.....
M. Narasimham, Junior Lecturer in Agriculture, Bapatla.	16 Oct. 1951 ..	21 July 1952 ..	.....
T. R. Narayana Iyer, Plant Physiologist, Coimbatore.	1 Mar. 1952 ..	31 Mar. 1952 ..	.....
C. Raghavendrachar, Soil Survey Officer, Bellary.	19 Nov. 1951 ..	28 Nov. 1951 ..	.....
N. S. Rajagopala Iyer, District Agricultural Officer, Sattur.	1 Aug. 1951 ..	14 Aug. 1951 ..	.....
S. Ramachandran, Government Entomologist, Coimbatore.	31 May 1952 ..	4 July 1952 ..	.....
K. Raman Menon, Special District Agricultural Officer (Crop sampling), Coimbatore.	1 Jan. 1952 ..	31 Mar. 1952 ..	.....
V. Rama Rao, Special District Agricultural Officer (Crop sampling), Kakinada.	4 May 1952 ..	1 Aug. 1952 ..	.....
S. Sampath, Cytogeneticist, Bapatla at Coimbatore.	1 Apr. 1952 ..	20 Apr. 1952 ..	.....
N. Sankaranarayana Reddi, Assistant Agricultural Engineer (Contour Bunding), Bellary.	3 July 1951 .. 19 May 1952 ..	14 July 1951 .. 7 June 1952 ..	.....
K. Santhanam, Special District Agricultural Officer (Crop sampling), Madras.	31 May 1952 ..	18 Aug. 1952 ..	.....
M. Sathyanarayana, Lecturer in Agriculture, Coimbatore.	15 Aug. 1951 ..	14 Sep. 1951 ..	.....
C. R. Seshadri, Assistant Oilseeds Specialist, Coimbatore.	1 Sep. 1951 ..	31 Dec. 1951 ..	.....
A. R. Seshadri, Assistant Entomologist, Coimbatore.	28 Jan. 1952 ..	11 Feb. 1952 ..	.....
E. G. Sivasami, District Agricultural Officer, Saidapet.	11 May 1951 ..	9 July 1951 ..	.....
M. S. Subbiah, Assistant Entomologist, Coimbatore.	26 Dec. 1951 ..	15 Jan. 1952 ..	.....
V. T. Subbiah Mudaliar, Lecturer in Agriculture.	1 July 1951 .. 22 Oct. 1951 ..	27 July 1951 .. 21 Feb. 1952 ..	.....
K. Srinivasacharya, Special District Agricultural Officer (Crop sampling), Tanjore.	24 Oct. 1951 ..	2 Dec. 1951 ..	.....

APPENDICES

Name and designation.	Period		Remarks.
	From	To	
N. Subramani Iyer, Deputy, Director of Agriculture, Coimbatore.	4 June 1951 ..	16 Sep. 1951 ..	Leave preparatory to retirement.
A. H. Subramania Sarma, Gazetted Assistant, Lecturer in Agriculture, Coimbatore.	27 Dec. 1951 ..	10 Jan. 1952 ..	....
S. Sundaram, Assistant Cotton Specialist on foreign service under the Indian Coffee Board.	9 Jan. 1952 ..	25 Jan. 1952 ..	....
V. Thirumala Rao, Crop and Plant Protection Officer (Entomology), Bapatla.	20 June 1952 ..	21 July 1952 ..	....
G. Venkatanarayana, Oil-seeds Specialist, Coimbatore.	22 Jan. 1952 ..	20 May 1952 ..	....
S. N. Venkataramana Iyer, State Marketing Officer, Madras.	1 Mar. 1952 ..	30 June 1952 ..	....
P. K. Parameswara Menon, Assistant Marketing Officer, Oudhapah.	11 Feb. 1952 ..	10 June 1952 ..	....
T. S. Lakshmanan, Assistant Agricultural Chemist, Coimbatore.	19 Mar. 1952 ..	17 Aug. 1952 ..	....
A. Raghavan, Assistant Cotton Specialist, Siruguppa.	7 Mar. 1952 ..	6 July 1952 ..	....
N. V. Kalyanasundaram, Sugarcane Inspector, Visakhapatnam.	17 June 1952 ..	1 Aug. 1952 ..	....
B. K. Sadasiva Rao, Assistant Agricultural Engineer (Civil), Coimbatore.	17 May 1952 ..	13 July 1952 ..	....
Dr. R. Ramamurthi Reddi, Bio-Chemist, Kodur.	4 June 1952 ..	20 July 1952 ..	....
	14 June 1952 ..	13 Aug. 1952 ..	....

APPENDIX VIII.

Strength of staff in the Agricultural Department during 1951-52.

Category and name of post.	Number of posts.		
	Permanent.	Temporary.	Total.
GAZETTED OFFICERS.			
District Category—			
Director of Agriculture	1	..	1
Joint Director of Agriculture	1	1	2
Category 2—			
Principals of Agricultural Colleges, Coimbatore and Bapatla	2	..	2
Headquarters Deputy Directors	1	1	2
Total ..	3	1	4
Category 3—			
(The posts of Deputy Director of Agriculture Engineering and Propaganda are kept in abeyance).			
Regional Deputy Directors including Deputy Director for Crop Sampling and Compost Development Officer	6	4	10
Lecturer in Agriculture, Coimbatore	1	..	1

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Category and name of post.	Number of posts.		
	Permanent.	Temporary.	Total.
GAZETTED OFFICERS—cont.			
Category 3—cont.			
Senior Lecturer in Agriculture, Bapatla	1	..	1
State Marketing Officer	1	..	1
Total ..	9	4	13
Category 4—			
Paddy Specialist	1	..	1
Millet Specialist	1	..	1
Cotton Specialist	1	..	1
Oil Seeds Specialist	1	..	1
Fruit Specialist	1	..	1
Sugarcane Specialist	..	1	1
Pulses Specialist	..	1	1
Cotton Extension Officer	..	1	1
Government Agricultural Chemist	1	..	1
Government Entomologist	1	..	1
Government Mycologist	1	..	1
Government Lecturing and Systematic Botanist	1	..	1
Total ..	9	3	12
Category 5—			
District Agricultural Officer, Sugarcane Inspectors, Seed Development Officer	27	20	47
Superintendent, Central Farm	1	..	1
Agronomist, Siruguppa	1	..	1
Gazetted Assistant to Headquarters Deputy Director of Agriculture	1	..	1
Gazetted Assistant in Agriculture, Coimbatore	1	..	1
Junior Lecturer in Agriculture, Bapatla	1	..	1
Assistant Marketing Officers	4	..	4
Total ..	36	20	56
Category 5-A—			
Curator, Ootacamund	1	..	1
Category 6—			
Lecturer in Agricultural Economics	1	1	2
Assistant Entomologists	5	5	10
Assistant Mycologists (including Sugarcane)	2	5	7
Assistant Agricultural Chemists (including Sugarcane and Malt Chemists)	5	6	11
Agricultural Bacteriologists	1	..	1
Soil Physicist	1	..	1
Bio Chemist	1	..	1
Superintendents, Agricultural Research Stations.	9	3	12
Superintendents, Sugarcane Liaison Farms and Assistant Agronomist	..	5	5
Assistant Cotton Specialists	3	10	13
Assistant Paddy Specialists including Seed Development Officer for Paddy	2	2	4
Assistant Millet Specialist including Seed Development Officer for Millets	..	5	5
Assistant Oil Seeds Specialist	1	2	3
Assistant Fruit Specialist (including Superintendents, Wynad and Fruit Research Station, Kodur and Banana Research Officer, Aduthurai).	2	4	6
Cytogeneticists	2	..	2
Plant Physiologists, Coimbatore and Bapatla and Assistant Physiologist (Anakapalli)	1	2	3
Assistant Cotton Extension Officers	..	4	4
Assistant Lecturing and Systematic Botanist, Lecturer and Gazetted Lecturer in Botany and Assistant Botanist, Banana	2	2	4
Copper Specialist	..	1	1

Category and name of post.	Number of posts.		
	Permanent	Temporary	Total
GAZETTED OFFICERS—cont.			
Category 6—cont.			
Cardamom Specialist	1		1
Agricultural Meteorologist	1		1
Total	38	59	97
Category 7—			
Agricultural Research Engineer	1		1
Category 8—			
Assistant Agricultural Engineer (Civil)	2		2
Assistant Agricultural Engineer (Mechanical)	2		2
Assistant Agricultural Engineer (Headquarters)	2	1	3
Assistant Agricultural Engineer (Inspection)		6	6
Assistant Agricultural Engineer (Tractor Workshop)		2	2
Assistant Agricultural Engineer (Soil Conservation, Bellary and Nilgiris)		3	3
Assistant Agricultural Engineer (State Farming)		1	1
Assistant Agricultural Engineer (Tube well scheme)		1	1
Gazetted Assistant to Research Engineer		1	1
Total	6	15	21
Personal Assistant to the Director of Agriculture	1		1
Lecturer in Animal Hygiene		1	1
Senior Accounts Officer		1	1
Junior Accounts Officer		1	1
Assistant Accounts Officer		1	1
Total	1	4	5
Grand total	106	107	213
UPPER SUBORDINATES.			
I. Research Section—			
1 Paddy section	28	15	43
2 Millets section	17	15	32
3 Cotton section	20	35	55
4 Oil Seeds section	5	19	24
5 Pulses section	5		5
6 Botany section	7	7	14
7 Fruits section	13	10	23
8 Sugarcane section		2	2
9 Cytogenetics section		5	5
10 Plant Physiology section	12	8	20
11 Mycology section	16	8	24
12 Entomology section	21	38	59
13 Chemistry section			
Total	145	162	307
II. Agricultural Section—			
1 Personal Assistants to District Agricultural Officers	25	1	26
2 Taluk Agricultural Demonstrators	237	103	340
3 Marketing Assistants	6		6
4 Ento-Mycology Agricultural Demonstrators	10	49	59
5 Farm Managers, Agricultural Research Station	59	29	88
6 Teaching Assistants in Agriculture	4	12	16
7 Jail Agricultural Instructors	3		3
8 Journal Assistants	2	2	4
9 Agricultural Demonstrators, Vegetables, Madras	3		3
10 Technical Assistant to Director of Agriculture	1		1
11 Agricultural Demonstrators on Schemes		200	200
Total	350	396	746

Category and name of post.	Number of posts.		Total.
	Permanent.	Temporary.	
III. Engineering staff—			
1 Agricultural Engineering Supervisors	23	51	74
2 Foremen	12	25	37
3 Assistant Foremen	12	16	28
4 Senior Mechanics	1	27	28
5 Junior Mechanics	1	1	2
6 Senior Tractor Drivers	..	100	100
7 Junior Tractor Drivers	..	240	240
8 Oil-engine and pumpset Drivers	..	700	700
9 Lorry Drivers	..	40	40
10 Jeep Drivers.. .. .	..	35	35
11 Fitters	..	12	12
12 Loading Inspectors	..	2	2
13 Welders	..	3	3
14 Tractor cleaners	..	340	340
15 Jeep and lorry cleaner	..	19	19
16 Bus Drivers	..	6	6
17 Millers	..	2	2
IV. Madras Ministerial Service—			
Manager	1	..	1
Senior Superintendents	5	5	10
Junior Superintendents	11	20	31
Upper Division Clerks	52	188	240
Lower Division Clerks including Store-keepers	..	..	..
II Grade (45—90)	245	704	949
Typists and Steno-Typists	38	97	135
Storekeepers I Grade (25—3—40)	8	9	17
Do. III Grade (60—4—100)	..	26	26
Do. VI Grade (100—5—150)	..	1	1
V. Madras Agricultural Subordinate Service—			
Fieldmen, Grade I	39	..	39
Do. Grade II	159	707	866
VI. The Madras General Subordinate Service—			
Demonstration Maistris—			
Grade I	76	..	76
Grade II	424	835	1,259
Artists	9	7	16
Librarians	1	1	2
Assistant Librarians	1	1	2
Laboratory attendants	26	7	33
Attenders	26	28	54
Ward Attendant	1	1	2
Museum-curator	1	..	1
Draughtsmen	2	..	2
Veterinary Assistant Surgeon.. .. .	1	1	2
Veterinary Compounder	1	1	2
Civil Supervisors	1	..	1
Power House Operators	1	1	2
Electricians	1	1	2
Midwife	1	..	1
Sanitary Inspector	1	..	1
Mechanics	4	1	5
Sub-Assistant Surgeon.. .. .	1	..	1
Compounders	1	1	2
Lecturer in Animal Hygiene	1	1	2
Assistant Lecturer in Animal Hygiene	..	..	..
Madras Inferior Service—			
Daffadar	1	..	1
Peons	265	191	456

APPENDIX IX.

List of sugar factories in the Madras State which manufactured white sugar from sugarcane during 1951-52 season.

Name of factory.	Location.	District.	Average daily crushing capacity.	Actual crushing period in the 1951-52 season		Total quantity of cane crushed.	Number of licences granted under section 6 of the Act.	Average sugar recovery.	Grade or grades of sugar manufactured, L.B.S.
			TONS.	From	To			PER CENT.	
1 Sri Rama Sugars and Industries, Limited.	Seethanagaram ..	Srikakulam	800	3rd December 1951.	6th March 1952.	25,790	6	10.24	All grades.
2 Sri Rama Sugars and Industries, Limited.	Bobbili ..	..	450	12th November 1951.	11th March 1952.	45,158	5	8.97	Do.
3 The Ethikoppaka Co-operative Agricultural and Industrial Society, Limited, Factory No. I.	Ethikoppaka ..	Vishakhapatnam	65	14th December 1951.	4th June 1952.	9,538	3	9.14	Do.
4 The Ethikoppaka Co-operative Agricultural and Industrial Society, Limited, Factory No. II.	Darlapudi ..	Do.	..	16th June 1952.	20th June 1952.	773	15	7.45	Do.
5 The Vishakhapatnam Sugars and Industries, Limited.	Thummapala (Anakapalle taluk).	Do.	400	23rd November 1951.	2nd June 1952.	54,852	4	8.93	Do.
The Decosa Sugar and Abhari Company, Limited.	Samalkot ..	East Godavari	500	22nd January 1952.	7th June 1952.	58,078	11	8.59	28E, 27E, 26F, 29E and 26E.
The Kirilampudi Sugar Mills, Limited.	Pithapuram ..	Do.	600	3rd December 1951.	23rd June 1952.	84,535	12	7.93	27E, 28E and 29E.
The K.C.P., Limited	Vuyyur ..	Krishna	1,150	30th November 1951.	21st May 1952.	212,376	7	9.00	28E and 27E.
The India Sugars and Refineries, Limited.	Hoopet ..	Bellary	650	22nd October 1951.	21st June 1952.	132,634	3	9.44	28D, 27E and 28E.
The East India Distillers and Sugar Factories, Limited.	Nellikuppam ..	South Arcot	1,700	7th December 1951.	19th June 1952.	326,117	9	8.73	27E and 28E.
The Decosa Sugar and Abhari Company, Limited.	Pugalar ..	Tiruchirappalli	750	1st November 1951.	6th May 1952.	94,804	10	8.2	27E and 28E.
The Madurai Sugars and Allied Products, Limited.	Annayamalai, Kaveri.	Madurai	300	17th December 1951.	30th June 1952.	31,786	1	7.41	26E, 27E and 28E.
The Andhra Sugars, Limited.	Tanuku ..	W. Godavari	..	27th February 1952.	27th April 1952.	13,367	13	9.22	27E, 28E, 26E and 26D.
The Godavari Sugars and Refineries, Limited.	Do.	Do.	..	23rd February 1952.	15th April 1952.	2,243	14	7.10	27D, 27E, 28D and 28E.

APPENDIX X.

Work done by the honorary propagandists during 1951-52.

1 Number of villages visited	2,011
2 Number of demonstrations conducted with improved implements	95
Area covered	470 acres.
3 Quantity of improved seeds sold	1,237 tons.
4 Raising of improved seed nurseries	1,023 acres.
5 Number of compost pits constructed	2,398
6 Number of manure pits constructed	2,059
7 Number of dry earth cattle sheds for conserving cattle urine	1,337
8 Quantity of green manure seeds distributed	125 tons.
9 Quantity of pesticides distributed	842 lb.
10 Number of Agricultural Associations started	226
11 Number of meetings addressed	821
12 Number of new ryots induced to take up improved methods of agriculture	3,260
13 Number of vegetable seed packets sold	4,486
14 Number of subscribers enrolled for Grow More Food journals	347
15 Number of exhibitions conducted	35
16 Number of trees and stumps planted	305,165
17 Loan applications canvassed	Rs. 17,450
18 Quantity of artificial manures distributed	3,958 tons.
19 Treatment of seeds	44 "
20 Compost prepared from waste vegetable matter	194 "
21 Spraying done— (a) Demonstrations	287
(b) Area tackled	861 acres.
22 Dusting— (a) Demonstrations	97
(b) Area tackled	223 acres.
23 Demonstration for line sowing of crops	1,529 "
24 Quantity of cotton seed sold	249 lb.
25 Green leaf yielding trees planted	26,750

APPENDIX XI.

Paddy—Comparative Viability Data (N. Circars).

Year.	Number of bags having a viability range of					
	100-95 per cent.	94-90 per cent.	89-85 per cent.	84-80 per cent.	79 plus less.	Total per cent.
(1)	(2)	(3)	(4)	(5)	(6)	(7)
PRIMARY SEED FARMS SEED.						
1949-50	38.5	42.9	15.2	2.7	0.7	100
1950-51	71.5	24.9	3.4	..	..	100
1951-52	77.7	17.3	3.0	2.0	..	100
SECONDARY SEED FARM SEED.						
1949-50	45.4	41.4	10.2	1.9	1.1	100
1950-51	54.7	34.6	8.6	1.9	..	100
1951-52	72.0	19.0	6.0	3.0	..	100

Paddy—Comparative Purity Data (N. Circars).

Year.	Number of bags having a purity range of					Total per cent.
	100 per cent.	99 per cent.	98 per cent.	97 per cent.	96 and less.	
(1)	(2)	(3)	(4)	(5)	(6)	(7)
PRIMARY SEED FARM SEED.						
1949-50	31.02	36.53	24.57	4.11	3.77	100
1950-51	67.2	25.9	4.0	1.8	1.1	100
1951-52	59.0	33.0	7.0	0.8	0.2	100
Year.	100 per cent.	99-98 per cent.	97-96 per cent.	94-90 per cent.	88 per cent and less per cent.	Total per cent.
	(2)	(3)	(4)	(5)	(6)	(7)
SECONDARY SEED FARM SEED.						
1949-50	4.17	35.86	54.20	13.46	1.3	100
1950-51	10.2	50.9	26.0	5.70	8.2	100
1951-52	16.0	64.0	19.20	00.25	0.05	100

APPENDIX XII.

Statement showing the total area of waste lands so far localised to the end of June 1952.

Districts.	Lands, cultivable, having facilities for irrigation and parties are willing to reclaim. (A) (in acres.)	Lands cultivable which can be brought under cultivation with river pumping scheme. (B) (in acres.)	Lands other than (A) and (B) (C) (in acres.)	Number of villages visited.	Number of taluks visited.
(1)	(2)	(3)	(4)	(5)	(6)
Nellore	5,363.68	1,798.45	33,035.58	58	13
Ramanathapuram ..	5,070.93	238.00	17,554.16	78	9
Salem	5,529.00	..	4,920.78	23	4
	15,963.61	2,036.45	55,510.52	159	26
	A—15,963.61 B—2,036.45 C—55,510.52				
Total areas localised ..	73,510.58 acres.				

APPENDIX XIII.

Particulars of depots of manure firms inspected.

1 Number of depots inspected	5,311
2 Number of dealers without licence	597
3 Failures to maintain stock books, stock and price board, absence of markings on bags and other minor irregularities.	1,361
4 Number of samples analysed	563
5 Number of samples not up to guarantee	50

APPENDIX XIV-A.

Statement showing the distribution of tractors and bull-dozers.

Serial number and name of district.		With bull dozers.	Without bull dozers.	Total.
1 Srikakulam	..	5	3	8
2 Visakhapatnam	..	7	2	9
3 Arakuvalley	..	7	1	12
4 East Godavari	..	5	5	10
5 West Godavari	..	5	6	11
6 Krishna	..	6	10	16
7 Guntur	..	7	6	13
8 Nellore	..	5	4	9
9 Cuddapah	..	5	3	8
10 Kurnool	..	7	9	16
11 Bellary	..	8	4	12
12 Anantapur	..	6	5	11
13 Chittoor	..	10	8	18
14 Chingleput	..	6	5	11
15 North Arcot	..	6	6	12
16 South Arcot	..	5	9	14
17 Tanjore	..	5	8	13
18 Tiruchirappalli	..	8	5	13
19 Madurai	..	3	8	11
20 Ramanathapuram	..	4	4	8
21 Tirunelveli	..	7	4	11
22 Salem	..	12	12	24
23 Coimbatore	..	1	..	1
24 Nilgiris	..	2	2	4
25 North Malabar	..	5	3	8
26 South Malabar	..	7	2	9
27 South Kanara	..	..	..	..
Total	..	154	139	293

Name and type of tractor.		H.P.	Total number of tractors.	
(1)		(2)	With bull dozers.	Without bull dozers.
	Small type.		(3)	(4)
10/20 Mc Cormic Deering	..	20	..	2
Mc Cormic Deering W. 4	..	22	..	2
Massey Harris 30 K	..	22	..	20
Massey Harris 20 K	..	18.5	..	20
	Medium type.			
I.H.C. W.D. 9	..	40	..	13
Do. T.D. 9	..	40	9	2
Do. W.6	..	30	..	30
Do. T.6	..	30	20	2
Forlson Major	..	28	..	3
John Deere AW. and AR.	..	30	..	23
L.H. Case	..	40	..	1
I.H.C. T.D. 6 tractor	..	34	7	7
Caterpillar D. 4.	..	45	32	..
David Brown	..	25	..	13
	Heavy type.			
Caterpillar D. 6	..	65	48	..
Do. D. 7	..	75	11	1
I.H.C. T.D. 14	..	65	27	..
Total	..	..	154	139

NOTE.—Out of this 31 units have been acquired from the Army Surplus during 1946 in reconditioned stage and they are nearing completion of their life.

APPENDICES

APPENDIX XIV-B.

Statement showing the district war outturn of the departmental tractors and bull dozers for 1951-52.

Serial number and name of district.	Total number of hours bull dozers worked from 1st July 1951 to 30th June 1952.	Total outturn (ploughing, levelling and harrowing from 1st July 1951 to 30th June 1952).
	HOURS.	ACS.
1 Srikakulam	3,680	547
2 Visakhapatnam	5,198	1,067
3 East Godavari	3,720	1,181
4 West Godavari	4,282	2,391
5 Krishna	2,505	3,436
6 Guntur	6,312	4,287
7 Nellore	5,859	1,636
8 Kurnool	2,096	1,104
9 Anantapur	4,512	2,457
10 Bellary	5,196	3,782
11 Cuddapah	2,675	1,209
12 Chittoor	6,518	941
13 North Arcot	6,668	1,000
14 Chingleput	11,818	2,152
15 South Arcot	2,808	3,219
16 Tanjore	2,409	3,508
17 Tiruchirappalli	4,297	2,292
18 Madurai	7,862	2,363
19 Tirunelveli	3,184	1,599
20 Ramanathapuram	1,318	4,440
21 Salem	7,500	1,460
22 Coimbatore	16,691	4,064
23 The Nilgiris	86	230
24 North Malabar	1,636	338
25 South Malabar	6,136	573
26 South Kanara	6,454	483
27 Arakuvalley	..	224
Total ..	1,31,320	51,983

APPENDIX XIV-C.

Statement showing the progressive increase on the hire charges on tractors and bull dozers.

Details.	Rates of hire charges including transport charges which should be borne by the tractor from 1st April 1946 to 30th June 1950.	Rates of hire charges including transport charges which should be borne by the tractor from 1st July 1950 to 31st March 1952.	Rates of hire charges including transport charges from 1st April 1952.
(1)	(2)	(3)	(4)
	RS.	RS.	RS.
Ploughing (by all types of tractors)	(PER ACRE.)	(PER ACRE.)	(PER ACRE.)
Ploughing (shallow ploughing)	5 0 0	10 0 0	12 0 0
	3 0 0	5 0 0	7 0 0
	RS.	RS.	RS.
Levelling with bull dozers D. 7	(PER HOUR.)	(PER HOUR.)	(PER HOUR.)
Do. D. 6	9 0 0	12 0 0	14 0 0
Do. T.D. 14	7 0 0	10 0 0	12 0 0
Do. T.D. 9	7 0 0	10 0 0	12 0 0
Do. T.D. 6	7 0 0	8 0 0	10 0 0
Do. T. 6	7 0 0	8 0 0	10 0 0
Do. D. 4	7 0 0	8 0 0	10 0 0
	5 0 0	8 0 0	10 0 0

APPENDICES

APPENDIX XIV-D.

Statement showing the jurisdiction of the Assistant Agricultural Engineers.

Name of each Assistant Agricultural Engineer with Headquarters.	Name of the districts in his jurisdiction.
1 Assistant Agricultural Engineer, Anakapalli ..	Srikakulam, Visakhapatnam, East Godavari and Araku Valley.
2 Assistant Agricultural Engineer, Vijayavada ..	Krishna and West Godavari.
3 Assistant Agricultural Engineer, Vellore ..	Chittoor, Salem and North Arcot.
4 Assistant Agricultural Engineer, Tiruchirappalli.	Tiruchirappalli, Tanjore and South Arcot.
5 Assistant Agricultural Engineer, Madurai ..	Madurai, Ramanathapuram and Tirunelveli.
6 Assistant Agricultural Engineer, Bellary ..	Cuddapah, Bellary, Anantapur and Kurnool.
7 Assistant Agricultural Engineer (Tractor Workshop), Bapatla.	Nellore and Guntur.
8 Assistant Agricultural Engineer (Tractor Workshop), Coimbatore.	Coimbatore and Nilgiris.
9 Gazetted Assistant to Assistant Agricultural Engineer (Research), Coimbatore.	North Malabar, South Malabar and South Kanara.
10 Assistant Agricultural Engineer, Chingleput district, Saidapet.	Chingleput.

[APPENDIX XIV-E.

Statement showing the tractors and implements available with the department from 1945-46 to 1951-52.

Particulars.	1945-46.	1946-47.	1947-48.	1948-49.	1949-50.	1950-51.	1951-52.
Tractors	6	45	140	152	233	268	293
Bull dozer	..	27	27	42	60	136	154
Mould Board ploughs.	..	25	40	52	105	164	184
Disc harrows and cultivators.	1	20	33	41	96	97	97
Disc ploughs	7	33	47	193	287	351	355

APPENDIX XIV-F.

Details showing types and models of tractors with the Agricultural department.

Year.	I.H.C. Consisting of T. 6, T.D. 6, T.D. 9, W.D. 9 W. 4, 10 20 T.D. 14, W. 6.	John Deere Consisting of A-R, A-W, and A Model.	Caterpillar D. 6, D. 7, D. 4.	L.H. Case.	Masey Harris consisting of 30 K. and 20 K.	Fordson Major.	David Brown.	Total.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1945-46	4	1	..	1	..	..	..	6
1946-47	12	1	31	1	..	..	..	45
1947-48	64	1	31	1	40	3	..	140
1948-49	64	13	31	1	40	3	..	152
1949-50	114	23	53	1	40	3	..	233
1950-51	114	23	87	1	40	3	..	268
1951-52	121	23	92	1	40	3	13	293
Numbers attached with bull dozers.	63	..	91	..	..	..	..	154

APPENDIX XIV-G.

The following machineries have been purchased during the year 1951-52 :—

Description.	Number received.	Name of the supplier.	G.O. number and date.
(1)	(2)	(3)	(4)
1 Light weight winch 2-ton capacity.	1	Joseph Leslie & Co., Bombay.	G.O. Ms. No. 531, Food and Agriculture, dated 23rd March 1951.
2 Two-ton portable garage cranes.	1	Messrs. Simpson & Co., Madras.	G.O. Ms. No. 120, Food and Agriculture (Food Production), dated 28th March 1951.
3 Black Hawk serviceman tool kits.	7	Messrs. Larsen & Toubro, Ltd., Madras.	G.O. Ms. No. 30, Food and Agriculture (Food Production), dated 4th August 1950.
4 John Deere Killefer cultivator.	1	Do.	G.O. Ms. No. 189, Food and Agriculture (Food Production), dated 9th May 1951.
5 Mechanics tool kit ..	18	Messrs. Volkart Bros., Madras.	G.O. Ms. No. 228, Food and Agriculture (Food Production), dated 24th November 1950.
6 7-A Dozer for D-7 tractor.	2	Messrs. Larsen & Toubro, Ltd.	G.O. Ms. No. 227, Food and Agriculture (Food Production) dated 24th November 1950.
7 Cable control for D-7 tractor.	1	Do.	Do.
8 David Brown ridgers ..	2	Do.	G.O. Ms. No. 500, Food and Agriculture (Food Production), dated 14th November 1951.
9 Five-ton trailers ..	4	Messrs. Vikrama Engineering Co., Madras.	Do.
10 Howard rotavator ..	2	Messrs. Larsen & Toubro, Ltd., Madras.	Do.
11 Steel wheel for David Brown tractor.	2	Do.	G.O. Ms. No. 191, Food and Agriculture (Food Production), dated 11th May 1951.
12 David Brown tractor ..	4	Do.	G.O. Ms. No. 2442, Development, dated 29th May 1951, and G.O. Ms. No. 3948, dated 4th September 1951.
13 David Brown 2 furrow semi-digger plough.	4	Do.	Do.
14 Cultivator	4	Do.	Do.
15 David Brown ridgers ..	4	Do.	Do.
16 White lock Model A ..	4	Do.	Do.
17 Three-ton trailer David Brown 2 furrow disc plough.	4	Do.	Do.
18 D-4. tractors	5	Do.	G.O. Ms. No. 80, Food and Agriculture (Food Production), dated 4th August 1951.

Description.	Number received.	Name of the supplier.	G.O. number and date.
(1)	(2)	(3)	(4)
9 Birtley 4-A Bulldozers ..	5	Messrs. Larsen & Toubro, Ltd., Madras.	G.O. Ms. No. 222, Food and Agriculture (Food Production), dated 21st November 1950.
10 D-6 tractors with bulldozers.	7	Do.	G.O. Ms. No. 529, Food and Agriculture (Food Production), dated 30th November 1950.
11 David Brown tractors with rotavators.	9	Do.	Do.
12 Rear Steel wheel for David Brown tractor.	9	Do.	Do.
23 TD-14 Tractor with bulldozers.	7	Messrs. Volkart Bros., Madras.	Do.
24 Howard rotavator ..	4	Messrs. Larsen & Toubro, Ltd., Madras.	G.O. Ms. No. 425, Development dated 5th February 1952.
25 Bullgrader for TD-9 tractors.	5	Messrs. Volkart Bros., Madras.	G.O. Ms. No. 299, Food and Agriculture (Food Production), dated 23rd July 1951.
26 Portable garage cranes ..	3	Messrs. Simpson & Co., Madras.	G.O. Ms. No. 16, Food and Agriculture (Food Production), dated 22nd January 1952.
27 W.D. 6 tractor with attachments.	1	Messrs. Volkart Brothers, Madras.	G.O. Ms. No. 535, Food and Agriculture (Food Production), dated 5th December 1950.
28 8-A Three furrow mould board plough.	1	Do.	Do.
29 Number 19-A feet disc harrow.	1	Do.	Do.
30 Tankers 3 ton 4 wheel farm waggon.	1	Do.	Do.
31 PSG Make 2½ inches into 2½ inches pumps and fittings.	10	Messrs. V.S.R. & Co., Madras.	G.O. Ms. No. 174 Food and Agriculture (Food Production), dated 29th April 1952.
32 Seven hundred gallons capacity tanks.	4	Messrs. Vikramana Engineering Co., Madras.	Do.
33 Do.	4	Messrs. Kutty & Rao Engineers, Ltd., Madras.	Do.
34 Do.	2	Messrs. Ramana Engineering Works, Madras.	Do.

APPENDIX XV-A.

Statement showing the results of crop-cutting experiments on paddy
(first crop) in Madras State, 1951-52.

Name of districts.	Number of experiments planned.	Number of experiments considered for analysis.	Average yield.	Standard error.	Percentage standard error.
(1)	(2)	(3)	(4)	(5)	(6)
1 Chingleput	14	14	1,128.8	114.4	10.1
2 South Arcot	16	16	952.5	34.1	3.6
3 Chittoor	12	12	1,308.4	89.5	23.9
4 North Arcot	16	15	1,370.5	82.4	6.5
5 Salem	16	11	1,570.6	64.7	4.1
6 Coimbatore	20	9	1,180.7	259.6	22.0
7 Tiruchirappalli	12	12	1,147.7	194.1	16.9
8 Tanjore	46	45	996.8	70.1	7.0
9 Madurai	24	23	1,541.0	145.5	9.4
10 Tirunelveli	30	28	1,389.0	110.5	8.0
11 Malabar	98	91	764.0	37.1	5.0
12 South Kanara	72	72	978.1	51.1	5.2
State as a whole	376	348	989.9	24.1	2.4

APPENDIX XV-B.

Statement showing the results of crop-cutting experiments on paddy
(second crop) in Madras State, 1951-52.

Name of districts.	Number of experiments planned.	Number of experiments considered for analysis.	Average yield.	Standard error.	Percentage standard error.
(1)	(2)	(3)	(4)	(5)	(6)
1 Srikakulam	104	104	868.4	43.1	5.0
2 Visakhapatnam	56	54	968.6	78.9	8.1
3 East Godavari	96	94	1,101.5	47.9	4.3
4 West Godavari	116	116	1,097.5	45.8	4.2
5 Krishna	88	88	1,230.4	67.8	5.5
6 Guntur	60	54	1,252.2	68.3	5.5
7 Kurnool	60	38	599.8	115.8	19.3
8 Bellary	42	40	898.2	159.3	17.7
9 Anantapur	48	42	1,137.8	133.7	11.8
10 Cuddapah	70	63	863.5	111.1	12.9
11 Nellore	100	83	542.7	57.3	10.6
2 Chingleput	96	83	624.7	49.9	8.0
3 South Arcot	84	79	1,175.2	79.4	6.8
4 Chittoor	70	68	838.9	63.7	7.6
5 North Arcot	80	73	1,279.0	75.2	5.9
6 Salem	82	81	1,270.1	74.2	5.8
7 Coimbatore	78	70	1,292.7	81.6	6.3
8 Tiruchirappalli	84	73	952.3	77.0	8.1
9 Tanjore	140	139	1,000.4	42.8	4.3
10 Madurai	96	95	1,304.6	58.4	4.5
11 Ramanathapuram	100	95	634.5	76.0	12.0
12 Tirunelveli	90	79	1,107.5	67.5	6.1
13 Malabar	64	64	792.9	58.1	7.1
14 South Kanara	48	48	751.4	45.0	6.0
State as a whole	1,952	1,823	1,015.0	20.3	2.0

APPENDIX XV-C.

Statement showing the results of the crop-cutting experiments on paddy
(first and second) period in Madras State, 1951-52.

Name of districts.	Number of experiments planned.	Number of experiments considered for analysis.	Average yield of lb. per acre.	Standard error.	Percentage standard error.
(1)	(2)	(3)	(4)	(5)	(6)
1 Srikakulam	104	104	830	41.2	5.0
2 Visakhapatnam	56	54	928	75.4	8.1
3 East Godavari	96	94	1,053	45.8	4.4
4 West Godavari	116	116	1,050	43.8	4.2
5 Krishna	88	88	1,176	64.6	5.5
6 Guntur	60	54	1,197	65.3	5.5
7 Kurnool	60	38	573	110.7	19.3
8 Bellary	42	40	859	152.3	17.7
9 Anantapur	48	42	1,088	127.9	11.8
10 Cuddapah	70	63	825	106.2	12.9
11 Nellore	100	83	519	54.8	10.6
12 Chingleput	110	97	679	43.7	6.3
13 South Arcot	100	95	1,108	70.4	6.4
14 Chittoor	82	80	859	65.3	7.6
15 North Arcot	96	83	1,239	63.8	5.1
16 Salem	96	92	1,252	62.7	5.0
17 Coimbatore	100	79	1,212	81.8	6.7
18 Tiruchirappalli	96	85	932	68.5	7.3
19 Tanjore	188	184	956	37.6	3.9
20 Madurai	120	118	1,284	51.9	4.0
21 Ramanathapuram	100	95	607	72.6	12.0
22 Tirunelveli	120	107	1,106	56.4	5.1
23 Malabar	162	155	744	32.6	4.4
24 South Kanara	120	120	843	33.5	4.0
State as a whole	2,328	2,171	969	15.5	1.6

APPENDIX XV-D.

Statement showing the results of crop cutting experiments on paddy
(third period crop) in Madras State, 1951-52

Name of districts.	Number of experiments planned.	Number of experiments taken for analysis.	The average yield per acre.
(1)	(2)	(3)	(4)
1 East Godavari	32	30	596.98
2 West Godavari	20	16	820.23
3 Bellary	8	8	1,486.01
4 Anantapur	32	32	1,101.03
5 Chingleput	20	16	1,180.22
6 Chittoor	26	24	1,421.13
7 South Arcot	16	13	10.66.68
8 North Arcot	24	20	1,861.12
9 Salem	24	23	1,436.90
10 Tiruchirappalli	10	8	846.60
State as a whole	212	190	1,155.76

APPENDICES

APPENDIX XV-E.

Statement showing the results of crop-cutting experiments on unirrigated cholam, 1951-52.

Districts.	Planned experiments.	Considered for analysis.	Estimated acreage yield in lb.	Standard error.	Percentage standard error.
(1)	(2)	(3)	(4)	(5)	(6)
Visakhapatnam	40	16	677.1	44.6	6.59
East Godavari	48	34	682.3	68.4	11.59
West Godavari	40	7	349.1	68.4	19.59
Krishna	100	38	531.3	75.9	14.02
Guntur	192	103	579.3	68.3	11.79
Kurnool	200	66	417.4	58.5	11.02
Bellary	200	100	376.9	32.7	8.68
Anantapur	100	47	199.3	21.4	10.74
Cuddapah	112	20	101.8	40.3	39.59
Nellore	120	46	243.8	34.9	14.22
South Arcot	50	13	589.4	124.2	21.07
North Arcot	46	13	727.5	183.5	25.23
Salem	80	29	381.4	176.3	20.01
Coimbatore	108	49	266.6	71.5	26.82
Tiruchirappalli	80	42	335.1	68.6	20.53
Madurai	56	33	470.8	113.7	24.15
Ramanathapuram	20	6	246.3	67.5	27.41
State	1,592	663	379.7	16.8	4.42

N.B.—Thirty experiments in Tirunelveli district has been shifted over to the next fiscal year.

APPENDIX XV-F.

Statement showing the results of crop-cutting experiments on unirrigatedumbu, 1951-52.

Districts.	Planned experiments.	Considered for analysis.	Estimated acreage yield in lb.	Standard error.	Percentage standard error.
(1)	(2)	(3)	(4)	(5)	(6)
Srikakulam	20	6	475.0	150.2	31.6
Visakhapatnam	90	32	522.8	45.9	8.8
East Godavari	40	40	352.1	43.1	12.2
Guntur	120	42	357.1	78.6	22.0
Kurnool	48	11	274.8	120.6	43.9
Bellary	104	50	341.9	95.4	27.9
Anantapur	116	45	117.9	45.1	38.2
Cuddapah	48	18	64.3	17.5	27.2
South Arcot	60	19	289.4	65.8	23.7
Chittoor	80	25	112.4	72.8	64.8
North Arcot	40	18	297.3	27.3	9.2
Salem	110	11	239.0	85.6	35.8
Coimbatore	116	73	364.6	57.0	15.6
Tiruchirappalli	110	35	221.8	51.7	23.2
Ramanathapuram	70	43	391.7	46.3	11.8
Madurai	40	28	431.4	147.9	34.3
Tirunelveli	100	53	517.4	44.3	8.6
State	1,312	549	311.3	17.5	5.6

N.B.—Twenty-eight experiments planned in Nellore district were lost.

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APPENDIX XV-G.

Statement showing the results of crop cutting experiments on unirrigated ragi in Madras State, 1951-52.

Districts.	Number of experiments planned.	Considered for analysis.	Average yield lb. per acre.	Standard error.	Percentage standard error.
(1)	(2)	(3)	(4)	(5)	(6)
Srikakulam	28	4	421.25	47.5	11.0
Visakhapatnam	38	15	920.19	173.13	18.8
Chittoor	64	35	170.25	21.25	12.5
North Arcot	20	6	569.81	135.63	23.8
Salem	160	28	668.19	62.5	9.4
Coimbatore	56	35	538.75	53.13	9.9
Tiruchirappalli	12	10	415.75	115.00	27.7
State	392	133	500.94	35.63	7.1

APPENDIX XV-H.

Statement showing the results of crop cutting experiments on irrigated cholam in Madras State, 1951-52.

Districts.	Number of experiments planned.	Considered for analysis.	Average yield lb. per acre.	Standard error.	Percentage standard error.
(1)	(2)	(3)	(4)	(5)	(6)
Ramanathapuram	20	8	970.31	105.63	10.9
Salem	28	14	454.44	135.93	29.8
Tiruchirappalli	30	21	1,066.25	111.88	10.5
Tirunelveli	30	16	1,343.00	216.25	16.1
Madurai	58	33	1,130.13	119.38	10.6
Coimbatore	88	24	430.06	81.88	19.0
State	254	116	910.50	62.5	6.9

N.B.—Anantapur—20. Cuddapah—20. Nellore—20.
The experiments allotted in the above three districts were reported as lost.

APPENDIX XV-I.

Statement showing the results of crop cutting experiments on irrigatedumbu in Madras State, 1951-52.

Districts.	Number of experiments planned.	Considered for analysis.	Average yield lb. per acre.	Standard error.	Percentage standard error.
(1)	(2)	(3)	(4)	(5)	(6)
Nellore	52	16	927.75	138.1	14.9
Cuddapah	24	13	834.00	125.0	14.8
Salem	30	2	396.88	22.6	5.7
Coimbatore	48	29	776.06	95.6	12.3
Tiruchirappalli	26	16	881.25	216.9	24.6
Madurai	20	12	548.94	167.5	30.5
State	200	83	795.37	62.3	7.9

APPENDIX XV-J.

Statement showing the results of crop cutting experiments on irrigated paddy, first period, in Madras State, 1951-52.

Districts.	Number of experiments planned.	Considered for analysis.	Average yield lb. per acre.	Standard error.	Percentage standard error.
(1)	(2)	(3)	(4)	(5)	(6)
Srikakulam	4	2	981.25	43.8	4.5
Anantapur	48	37	1,142.50	105.0	9.2
Nellore	4	4	1,100.00	183.1	16.6
South Arcot	26	20	1,166.25	182.5	15.6
Chittoor	10	8	1,113.69	314.4	28.2
North Arcot	20	16	876.38	137.5	15.7
Chingleput	30	29	736.50	101.9	13.8
Coimbatore	60	52	1,182.00	72.5	6.1
Tiruchirappalli	12	3	833.31	505.5	60.6
Madurai	40	32	878.50	90.6	10.3
Ramanathapuram	40	30	669.69	73.1	10.9
Tirunelveli	20	20	1,073.13	83.1	7.7
State ..	314	253	987.5	27.25	2.8

N.B.—Two experiments in Vakhapatnam district were lost. Two hundred and fifty-two experiments allotted for Regt. II period, crop were not taken up for analysis.

APPENDIX XV-K.

Grow More Food aids results for the year 1951-52.
Average yield of dried paddy lb./acre.

Serial number and category.	Number of experiments planned.	Considered for analysis.	Recipient plots.		
			Yield.	Standard error.	Percentage standard error.
(1)	(2)	(3)	(4)	(5)	(6)
1. Seed	436	370	1,440.85	26.9	1.86
2. Green manure	344	296	1,423.7	30.9	2.2
3. Pre-manuring (fertiliser).	352	272	1,412.8	35.2	2.49
4. Post-manuring (fertiliser).	352	279	1,385.9	38.7	2.8

	Controlled plots.			Increase in yield.		
	Yield.	Standard error.	Percentage standard error.	Yield.	Standard error.	Percentage standard error.
	(7)	(8)	(9)	(10)	(11)	(12)
1. Seed	1,234.5	28.9	2.36	191.73	15.5	8.3
2. Green manure	1,192.14	26.3	2.2	231.64	18.0	7.8
3. Pre-manuring (fertiliser).	1,230.0	28.9	2.34	268.47	6.6	2.8
4. Post-manuring (fertiliser).	1,165.0	34.5	2.9	220.85	17.99	8.2

APPENDIX XV-L.

Statement showing the results of crop cutting experiments on paddy I, II and III period for 1951-52.

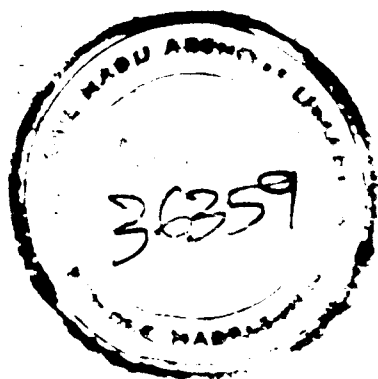
District.	Number of experiments planned.	Number of experiments considered for analysis.	Average yield of rice in lb./acre.	Production of rice in '0000 tons.	
				Estimated.	Official.*
Srikakulam	104	104	752	164	176
Vakhapatnam	56	54	926	119	103
1st Godavari	128	124	999	319	376
2nd Godavari	136	132	1,010	347	380
Tishna	88	88	1,176	361	328
untur	60	54	1,197	248	203
urnool	60	38	482	18	27
Ilary	50	48	902	15	14
anantapur	80	74	951	51	28
ddapah	70	63	799	32	19
Nlore	100	83	466	84	130
ingleput	130	113	736	162	125
1st Arcot	116	108	1,107	232	174
ittoor	103	104	999	71	34
am	120	115	1,304	93	66
2nd Arcot	120	108	1,239	105	68
mbatore	100	79	1,063	54	47
uchirappalli	106	93	924	182	185
ajore	186	184	956	589	625
durai	120	118	1,639	148	165
manathapuram	100	95	498	56	65
unelveli	120	107	1,060	149	148
labar	162	155	717	270	318
3rd Kanara	120	120	843	232	219
State ..	2,540	2,361	931	1,101	4,021

* From the final forecast report on rice for the year 1951-52.

APPENDIX XVI.

Glossary.

Apple ..	<i>Pyrus malus.</i>	Korra ..	<i>Sesuvia italica.</i>
Arecanut ..	<i>Areca catechu.</i>	Lime ..	<i>Citrus aurantifolia.</i>
Barley ..	<i>Hordeum vulgare.</i>	Linseed ..	<i>Linum catharticum.</i>
Bengalgram ..	<i>Cicer arietinum.</i>	Loquats ..	<i>Eriobotrya japonica.</i>
Ber ..	<i>Ziziphus jujuba.</i>	Lucerne ..	<i>Medicago sativa.</i>
Betel vine ..	<i>Piper betle.</i>	Maize ..	<i>Zea mays.</i>
Blackgram ..	<i>Phaseolus mungo.</i>	Mango ..	<i>Mangifera indica.</i>
Brinjal ..	<i>Solanum melongeni.</i>	Mongosteen ..	<i>Carcinia mangostana.</i>
Cardamom ..	<i>Allettia cardamomum.</i>	Mustard ..	<i>Brassica juncea.</i>
Carrot ..	<i>Daucus carota.</i>	Nappier grass ..	<i>Pennisetum purpureum.</i>
Cashewnut ..	<i>Anacardium occidentale.</i>	Neem ..	<i>Azadirachta indica.</i>
Castor ..	<i>Ricinus communis.</i>	Oats ..	<i>Avena sativa.</i>
Chillies ..	<i>Capicum Sp.</i>	Onions ..	<i>Allium cepa.</i>
Cholam ..	<i>Sorghum Sp.</i>	Oranges ..	<i>Citrus sp.</i>
Cloves ..	<i>Eugenia caryophyllata.</i>	Paddy ..	<i>Oryza sativa.</i>
Cocconut ..	<i>Cocos nucifera.</i>	Panivara ..	<i>Panicum miliaceum.</i>
Coffee ..	<i>Coffea arabica.</i>	Palmyra ..	<i>Borassus flabellifer.</i>
Coriander ..	<i>Coriandrum sativum.</i>	Papaya ..	<i>Carica papaya.</i>
Cotton ..	<i>Gossypium sp.</i>	Peach ..	<i>Prunus persica.</i>
Cambodia cotton ..	<i>Gossypium hirsutum.</i>	Pears ..	<i>Pyrus communis.</i>
Karungani cotton ..	<i>Gossypium arboreum var. frutescens.</i>	Pepper ..	<i>Piper nigrum.</i>
Pulichai cotton ..	<i>Gossypium arboreum var. neglectum forma bengalensis.</i>	Phillipesara ..	<i>Phaseolus trilobus.</i>
Western cotton ..	} Mixture of <i>Gossypium herbaceum</i> and <i>G. arboreum</i> .	Pineapple ..	<i>Ananas sativus.</i>
Northern cotton ..		Plantain ..	<i>Musa sapientum.</i>
Roseum cotton ..	<i>Gossypium arboreum var. typicum forma indica.</i>	Plums ..	<i>Prunus salicina.</i>
Nadam cotton ..	<i>Gossypium arboreum var. typicum forma indica.</i>	Pomegranate ..	<i>Punica granatum.</i>
Cowpea ..	<i>Vigna unguiculata.</i>	Potato ..	<i>Solanum tuberosum.</i>
Cumbu ..	<i>Pennisetum typhoides.</i>	Pungam ..	<i>Pongamia glabra.</i>
Dhalincha ..	<i>Sesbania aculeata.</i>	Radish ..	<i>Raphanus sativus.</i>
Durian ..	<i>Durio zibethinus.</i>	Ragi ..	<i>Eleusine coracana.</i>
Field beans ..	<i>Dolichos lablab.</i>	Redgram ..	<i>Cajanus cajan.</i>
Fig ..	<i>Ficus carica.</i>	Rubber plant ..	<i>Cryptostegia grandiflora.</i>
Garlic ..	<i>Allium sativum.</i>	Safflower ..	<i>Carthamus tinctorius.</i>
Gingelly ..	<i>Sesamum orientale.</i>	Samal ..	<i>Panicum miliare.</i>
Ginger ..	<i>Zingiber officinale.</i>	Sapota ..	<i>Achras sapota.</i>
Gogu ..	<i>Hibiscus cannabinus.</i>	Soya beans ..	<i>Glycine max.</i>
Grape fruit ..	<i>Citrus paradisi.</i>	Straw berries ..	<i>Fragaria vesca.</i>
Greengram ..	<i>Phaseolus aureus.</i>	Sugarcane ..	<i>Saccharum officinarum.</i>
Groundnut ..	<i>Arachis hypogea.</i>	Sunn hemp ..	<i>Crotalaria juncea.</i>
Guava ..	<i>Psidium guajava.</i>	Tamarind ..	<i>Tamarindus indica.</i>
Guinea grass ..	<i>Panicum maximum.</i>	Taploca ..	<i>Manihot utilisima.</i>
Horsegram ..	<i>Dolichos biflorus.</i>	Tenal ..	<i>Sesuvia italica.</i>
Indigo ..	<i>Indigofera sumatrana.</i>	Toosinto ..	<i>Euchalaena mexicana.</i>
Jack ..	<i>Artocarpus integer.</i>	Totacco ..	<i>Nicotiana tabacum.</i>
Kikuyu grass ..	<i>Pennisetum clandestinum.</i>	Tree-tomato ..	<i>Cyphomandra batatas.</i>
Kollim ..	<i>Tephrosia purpurea.</i>	Travellers' tree ..	<i>Ravennala madagascariensis.</i>
Killagangra ..	<i>Ipomea hirsuta.</i>	Tung oil plant ..	<i>Aleurites fordii.</i>
Kelakatu grass ..	<i>Cenchrus ciliaris.</i>	Turneric ..	<i>Curcuma longa.</i>
		Varagu ..	<i>Paspalum erubescens.</i>
		Variga ..	<i>Panicum miliaceum.</i>
		Water hyacinth ..	<i>Eichornia crassipes.</i>
		Wheat ..	<i>Triticum sp.</i>
		Wild indigo ..	<i>Tephrosia purpurea.</i>



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